TABLE OF CONTENTS

1. OBJECTIVES OF THE WORK 1
    1.1. Requirements of the Work Order 1
    1.2. Scientific Objective 1

2. PHILOSOPHY OF THE WORK 1
    2.1. Ecosystems, Landscapes and Landtype Associations 1

3. RELATIONSHIP WITH ECOMAP 3

4. METHODS 5
    4.1. Data Used to Delineate Map Units 5
    4.2. Land Unit Statistics 6
    4.3. Interactions with BLM Personnel 8

5. LAND AREA DELINEATIONS: RATIONALES AND DESCRIPTIONS 8
    5.1. Overview 8
    5.2. Rationales and Descriptions of Domain, Divisions and Provinces 9
    5.3. Rationales and Descriptions of Sections and Subsections of the Intermountain Semi-Desert Province (342) 10
        5.3.1. Bear Lake Section (342E) 11
            5.3.1.1. Bear Lake Subsection (342Ea) 12
        5.3.2. Green River Basin Section (342G) 12
            5.3.2.1. Lower Green River Basin Subsection (342Ga) 12
            5.3.2.2. Rock Springs Uplift Subsection (342Gc) 13
            5.3.2.3. Washakie Basin Subsection (342Gd) 13
            5.3.2.4. Upper Green River Basin Subsection (342Ge) 14
        5.3.3. Great Divide Basin Section (342X) 14
            5.3.3.1. Great Divide Basin Subsection (342Xa) 14
    5.4. Rationales and Descriptions of Sections and Subsections of the Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province (M331) 14
        5.4.1. Overthrust Mountains Section (M331D) 15
        5.4.2. Uinta Mountains Section (M331E) 16
            5.4.2.1. Uinta Mountains Subsection (M331Ea) 16
        5.4.3. Northern Parks and Ranges Section (M331I) 17
            5.4.3.1. Sierra Madre Subsection (M331Iu) 17
        5.4.4. Wind River Range Section (M331J) 17
        5.4.5. Gros Ventre Range Section (M331X) 17
    5.5. Landtype Associations of the Intermountain Semi-Desert Province (342) 18
        5.5.1. Landtypes Associations of the Bear Lake Section (342E) 19
            5.5.1.1. Bear Lake Subsection (342Ea) 19

5.5.1.1.1. Broken Hills (342Ea24) 19
5.5.1.1.2. Channeled Hills (342Ea25) 19
5.5.1.1.3. Multiple Cuesta and Valley Complexes (342Ea51) 20
5.5.1.1.4. Structural Valleys (342Ea81) 20
5.5.1.1.5. Lakes and Reservoirs (342Ea83) 21
5.5.2. Landtypes Associations of the Green River Basin Section (342G) 21
5.5.2.1. Lower Green River Basin Subsection (342Ga) 21
5.5.2.1.1. Isolated Mountains (342Ga21) 22
5.5.2.1.2. Granite Tors and Boulder Fields (342Ga22) . 22
5.5.2.1.3. Uplands (342Ga23) 23
5.5.2.1.4. Dissected Plateaus (342Ga33) 23
5.5.2.1.5. Canyonlands (342Ga34) 24
5.5.2.1.6. Breaks (342Ga35) 24
5.5.2.1.7. Mesas (342Ga36) 24
5.5.2.1.8. Recessional Escarpments (342Ga41) 26
5.5.2.1.9. Multiple Cuesta and Valley Complexes (342Ga51) 27
5.5.2.1.10. Single Cuestas (342Ga52) 28
5.5.2.1.11. Glacial Till and Outwash Hills (342Ga61) . . 29
5.5.2.1.12. Rolling Plains (342Ga71) 29
5.5.2.1.13. Rolling Plains and Alluvial Valleys (342Ga72) 31
5.5.2.1.14. Rolling Plains and Tablelands (342Ga73) . . . 31
5.5.2.1.15. Reservoirs (342Ga83) 32
5.5.2.2. Rock Springs Uplift Subsection (342Gc) 32
5.5.2.2.1. Mesas (342Gc36) 32
5.5.2.2.2. Multiple Cuesta and Valley Complexes (342Gc51) 32
5.5.2.2.3. Rolling Plains (342Gc71) 33
5.5.2.3. Washakie Basin Subsection (342Gd) 33
5.5.2.3.1. Isolated Mountains (342Gd21) 33
5.5.2.3.2. Recessional Escarpments (342Gd41) 34
5.5.2.3.3. Multiple Cuesta and Valley Complexes (342Gd51) 35
5.5.2.3.4. Single Cuestas (342Gd52) 35
5.5.2.3.5. Rolling Plains (342Gd71) 36
5.5.2.3.6. Channeled Plains (342Gd75) 37
5.5.2.4. Upper Green River Basin Subsection (342Ge) 37
5.5.2.4.1. Uplands (342Ge23) 37
5.5.2.4.2. Mesas (342Ge36) 38
5.5.2.4.3. Glacial Till and Outwash Hills (342Ge61) . . . 38

6.4. Line Attributes 51
    6.4.1. Items 51
    6.4.2. Item Definitions 51
    6.4.3. Sample Records from the Arc Attribute Table 53
6.5. Map Accuracy 54

7. DETAILS OF THE LANDTYPE COVERAGES 56
7.1. General Information 56
    7.1.1. Dune Fields and Playas Coverage 56
    7.1.2. Badlands Coverage 56
7.2. Arc/Info Descriptions 57
    7.2.1. Dune Fields and Playas Coverage 57
    7.2.2. Badlands Coverage 57
7.3. Polygon Attributes 58
    7.3.1. Items 58
    7.3.2. Item Definitions 58
7.4. Line Attributes 59
    7.4.1. Items 59
    7.4.2. Item Definitions 59
7.5. Map Accuracy 59

8. CONTRACT PRODUCTS 60

9. LITERATURE CITED 60

10. FIGURES 64

11. APPENDIX: TABULAR DATA FOR MAP FEATURES A-1

5.5.2.4.4. Rolling Plains and Alluvial Valleys (342Ge72) . . . 39
5.5.2.4.5. Lakes and Reservoirs (342Ge83) . . . 39
5.5.3. Landtypes Associations of the Great Divide Basin Section (342X) . . . 39
5.5.3.1. Great Divide Basin Subsection (342Xa) . . . 39
5.5.3.1.1. Isolated Mountains (342Xa21) . . . 39
5.5.3.1.2. Uplands (342Xa23) . . . 40
5.5.3.1.3. Recessional Escarpments (342Xa41) . . . 41
5.5.3.1.4. Multiple Cuesta and Valley Complexes (342Xa51) . . . 41
5.5.3.1.5. Single Cuestas (342Xa52) . . . 42
5.5.3.1.6. Rolling Plains (342Xa71) . . . 42
5.6. Landtype Associations of the Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province . . . 43
5.6.1. Overthrust Mountains Section (M331D) . . . 43
5.6.1.1. Subsections: none delineated . . . 43
5.6.1.1.1. Mountainous Terrain (M331D-11) . . . 43
5.6.1.1.2. Structural Valleys (M331D-81) . . . 44
5.6.1.1.3. Lakes and Reservoirs (M331D-83) . . . 44
5.6.2. Uinta Mountains Section (M331E) . . . 44
5.6.2.1. Uinta Mountains Subsection (M331Ea) . . . 44
5.6.2.1.1. Mountainous Terrain (M331Ea11) . . . 44
5.6.3. Northern Parks and Ranges Section (M331I) . . . 45
5.6.3.1. Sierra Madre Subsection (M331Iu) . . . 45
5.6.3.1.1. Mountainous Terrain (M331Iu11) . . . 45
5.6.4. Wind River Range Section (M331J) . . . 45
5.6.4.1. Subsections: none delineated . . . 45
5.6.4.1.1. Mountainous Terrain (M331J-11) . . . 45
5.6.5. Gros Ventre Range Section (M331X) . . . 46
5.6.5.1. Subsections: none delineated . . . 46
5.6.5.1.1. Mountainous Terrain (M331X-11) . . . 46
5.7. Special Landtypes of the Intermountain Semi-Desert Province . . . 47
5.7.1. Badlands . . . 47
5.7.2. Dune Fields . . . 47
5.7.3. Playas . . . 48

6. DETAILS OF THE LANDTYPE ASSOCIATION COVERAGE . . . 48
6.1. General Information . . . 48
6.2. Arc/Info Description . . . 49
6.3. Polygon Attributes . . . 49
6.3.1. Items . . . 49
6.3.2. Item Definitions . . . 49
6.3.3. Sample Records from the Polygon Attribute Table . . . 51

LIST OF TABLES AND FIGURES

Table 1. Principal map unit design criteria of ecological units of the National Hierarchical Framework of Ecological Units (ECOMAP 1993). 4

Table 2. Map scale and polygon size of ecological units of the National Hierarchical Framework of Ecological Units (ECOMAP 1993). 5

Table 3. Estimates of the horizontal accuracy of the GIS layers used in the delineations of the Landtype Association coverage. 55

Fig. 1. Mosaic of thematic mapper data for southwest Wyoming with bands 4, 5 and 3 rendered in red, green and blue, respectively. 64

Fig. 2. Geology of southwest Wyoming derived from Love and Christiansen (1985). The legend for the map is not shown due to the number of geologic units and the map scale. For unit identification see Love and Christiansen (1985). 65

Fig. 3. Elevations for southwest Wyoming as they occur in 100 m intervals derived from 90 m DEM data. 66

Fig. 4. Slope of southwest Wyoming derived from 90 m DEM data. Brighter areas indicate steeper slopes. 67

Fig. 5. Shaded relief of southwest Wyoming derived from 90 m DEM data. 68

Fig. 6. Mean annual precipitation isolines for southwest Wyoming shown over shaded relief. The isoline interval is 100 mm, with supplementary isolines (dashed lines) at 50 mm intervals. Precipitation values in millimeters are shown for the index isolines. 69

Fig. 7. Land cover of southwest Wyoming derived from Wyoming GAP land cover map. 70

Fig. 8. Provinces of southwest Wyoming as delineated by Reiners and Thurston. . . 71

Fig. 9. Sections of southwest Wyoming as delineated by Reiners and Thurston. . . . 72

Fig. 10. Subsections of southwest Wyoming as delineated by Reiners and Thurston. 73

Fig. 11. Landtype Associations of southwest Wyoming as delineated by Reiners and Thurston. The user assigned polygon ID numbers for the Landtype Association coverage are shown for each polygon. 74

Fig. 12. Dune field, playa and badland Landtypes of southwest Wyoming as delineated by Reiners and Thurston and displayed over Landtype Associations. 75

Fig. 13. Aerial view of Miocene Sandstone Dissected Plateau. 76

Fig. 14. Aerial view of Cedar Mountain Mesa. 76

Fig. 15. Aerial view of Blacks Fork Rolling Plains and Alluvial Valleys. 77

Fig. 16. Aerial view of badlands off the southeastern corner of The Haystacks, Washakie Basin. 77

Fig. 17. Aerial view of Kinney Rim, a single cuesta on the southwestern boundary of the Washakie Basin. 78

Fig. 18. Aerial view of multiple cuesta and valley complex around the Rawlins Uplift in the Great Divide Basin Section. 78

Fig. 19. Aerial view south down the Salt River Range. 79

Fig. 20. Aerial view of badlands Landtype south of The Haystacks, Washakie Basin. 79

Fig. 21. Aerial view of Killpecker dune fields west of Steamboat Mountain. 80

Fig. 22. Arcs of the Landtype Association coverage in the west part of the southwest Wyoming area with the user-assigned arc identification numbers shown for arcs longer than 3000 m. 81

Fig. 23. Arcs of the Landtype Association coverage in the east part of the southwest Wyoming area with the user-assigned arc identification numbers shown for arcs longer than 3000 m. 82

1. OBJECTIVES OF THE WORK

1.1. Requirements of the Work Order

1.1.1. "The University of Wyoming, Department of Botany, will delineate landscape complexes (landtype associations sensu Bailey (1980)) within the portion of the Great Divide Basin in Wyoming in the counties listed under - location of work."

1.1.2. "The location of the work area is Lincoln, Uinta, Sublette, and Sweetwater Counties together with portions of Fremont and Carbon Counties lying south and west of the Continental Divide."

1.1.3. "Delineations will be based on a combination of LANDSAT Thematic Mapper remotely sensed imagery; GIS (geographic information system) spatial data representing topography, geology, climate, soils and vegetative land cover; and aided by extant map delineations such as Bailey's ecoregions (Bailey 1980) and Hammond's physiographic land units."

1.1.4. "The landscape complexes will be provided in both paper map form and Arc/Info digital form. The scale, organization and other related items will be determined by the BLM."

1.1.5. Deliverables [will include]:

a) 25 copies of a written report with rationale for the delineations,
b) a preliminary map product within 5 months of the initiation of the agreement,
c) 3 sets of slides of the maps,
d) 3 sets of overlays for the overhead projector,
e) 3 small paper maps and 3 large paper maps will be produced. Scale and content to be determined by the BLM.

1.2. Scientific Objective

The objective of this work is to provide a scientifically based, hierarchical system of map units for southwestern Wyoming that incorporates ecological principles and processes across a range of scales.

2. PHILOSOPHY OF THE WORK

2.1. Ecosystems, Landscapes and Landtype Associations

This work is a continuation of related work with the Wyoming State Office of the Bureau of Land Management in which we delimited land units in Sheridan, Johnson, Campbell, Crook, Weston, Converse and Niobrara Counties (Reiners and Thurston 1994, 1995). The goal of this present work is to map terrain features within southwest Wyoming (see definition in section 1.1) having similar terrain configuration, ecological properties and management implications within which situational landscape-ecosystems can logically and conveniently be defined (Bureau of Land Management 1994). This is a terrestrial-centered approach--dividing terrain into map units in terms of terrain features. An alternative approach for hydrologic and aquatic-centered objectives, would be a watershed-centered approach which recently has been described by Maxwell et al. (1995).

Our approach follows the formal structure of the ECOMAP (1993) national hierarchy of ecological units (see section 3). We have mapped Landtype Associations as well as higher hierarchical units in which Landtype Associations are imbedded. Landtype Associations are defined by ECOMAP (1993) as units at the "landscape scale" as follows:

> "groupings of Landtypes or subdivisions of Subsections based upon similarities in geomorphic process, geological rock types, soil complexes, stream types, lakes, wetlands, and series, subseries, or plant association vegetation communities. Repeatable patterns of soil complexes and plant communities are useful in delineating map units at this level. Names of Landtype Associations are often derived from geomorphic history and vegetation community."

For our purposes in this mapping work, we view Landtype Associations as aggregates of similar landscapes, regardless of whatever criterion is used for landscape definition. Landtype Associations are relatively large units (100's to 1000's of acres) featuring predictably occurring terrain features. Diagnostic terrain features characteristic of Landtype Associations include the form, extent and nature of ridges, cliffs, rock outcrops, talus slopes, fans, stream channels and associated terraces, benches, ravines, etc. We expect that each of these terrain features may bear different ecosystem components in terms of plant, animal and microbial populations and functions, and can be viewed as local area ecosystems.

We believe that understanding the topographic and ecological character of individual Landtype Associations will be an initial step to effective subdivision of these into landscapes determined by defined management needs. For example, further subdivision might well be done at the level of first or second order watersheds in some cases, or encompass an entire ridge-escarpment unit in others. However defined, it is important that these landscape units will have recognizable structural, functional and temporally dynamic properties as outlined by Turner and Gardner (1991).

In deciding whether geographic features should be mapped as a Landtype Association, we have asked ourselves the practical question:

> **"would this feature be recognized by land users and managers in the field, and would they agree that it is sufficiently different from surrounding terrain that they would consider its management differently?"**

In mapping Landtype Associations, we have not mapped land units on the basis of where boundaries ought to be based on small scale (low resolution) climate or geology maps, but rather, where GIS data and our field reconnaissance indicate recognizable common terrain properties within the Association that are recognizably different from terrain outside of the Association.

In addition to mapping Landtype Associations, we have also mapped higher hierarchical levels of the National Hierarchy of Ecological Units for the defined map area (see section below). In this process, we have defined land units up to two hierarchical levels above Landtype Association. These definitions of higher hierarchical units conform with nationally accepted nomenclature but differ, in some cases, with respect to location.

3. RELATIONSHIP WITH ECOMAP

A memorandum of agreement between the USDA Forest Service, DOI Bureau of Land Management, National Biological Survey (Service), U.S. Geological Survey, Fish and Wildlife Service, and the Environmental Protection Agency has been signed for the purpose of developing a common ecological map of the United States. The structure for this mapping project is defined as a National Hierarchical Framework of Ecological Units and has been defined and discussed in a report with the same title and cited here as ECOMAP (1993).

The basic units and some of their descriptors are given in Tables 1 and 2. Map units from Domain down to Province level have been mapped and published (Bailey 1995). In addition, the ECOMAP project has mapped land units for the United States down to the Sectional level (Bailey et al. 1994) and has described the sections in McNab and Avers (1994). A branch of the ECOMAP project, led by Dr. Jerry Freeouf at the Region 2 Headquarters of the USFS in Denver, is in the process of mapping at the Subsection level. We have benefitted by receiving a provisional sketch map of this work for Wyoming.

We have attempted to bring our map unit definitions into conformance with the nomenclature and suggested polygon sizes of that project. We have created Section, Subsection and Landtype Associations for this work area in conformance with our understanding of the definitions provided by ECOMAP (1993). We have not adopted all of the units and delineation locations as they have been drawn in a provisional map by Freeouf and associates, however.

Table 1. Principal map unit design criteria of ecological units of the National Hierarchical Framework of Ecological Units (ECOMAP 1993).

ECOLOGICAL UNIT	PRINCIPAL MAP UNIT DESIGN CRITERIA[1]
Domain	• Broad climatic zones or groups (e.g., dry, humid, tropical).
Division	• Regional climatic types (Koppen 1931, Trewartha 1968). • Vegetational affinities (e.g., prairie or forest). • Soil Order
Province	• Dominant potential natural vegetation (Kuchler 1964). • Highlands or mountains with complex vertical climate-vegetation-soil zonation.
Section	• Geomorphic province, geologic age, stratigraphy, lithology. • Regional climatic data. • Phases of soil orders, suborders or great groups. • Potential natural vegetation. • Potential natural communities (PNC) (FSH 2090)
Subsection	• Geomorphic process, surficial geology, lithology. • Phases of soil orders, suborders or great groups. • Subregional climatic data. • PNC-formation or series.
Landtype Association	• Geomorphic process, geologic formation, surficial geology, and elevation. • Phases of soil subgroups, families, or series. • PNC-series, subseries, plant associations.
Landtype	• Landform and topography (elevation, aspect, slope gradient, and position). • Phases of soil subgroups, families, or series. • Rock type, geomorphic process. • PNC-plant associations.
Landtype Phase	• Phases of soil families or series. • Landform and slope position. • PNC-plant association or phases.

[1] It should be noted that the criteria listed are broad categories of environmental and landscape components. The actual classes of components chosen for designing map units depend on the objectives for the map.

Table 2. Map scale and polygon size of ecological units of the National Hierarchical Framework of Ecological Units (ECOMAP 1993).

ECOLOGICAL UNIT	MAP SCALE RANGE	GENERAL POLYGON SIZE
Domain	1:30,000,000 or smaller	1000,000's of square miles
Division	1:30,000,000 to 1:7,500,000	100,000's of square miles
Province	1:15,000,000 to 1:5,000,000	10,000's of square miles
Section	1:7,500,000 to 1:3,500,000	1,000's of square miles
Subsection	1:3,500,000 to 1:250,000	10's to low 1,000's of square miles
Landtype Association	1:250,000 to 1:60,000	100's to 1,000's of acres
Landtype	1:60,000 to 1:24,000	10's to 100's of acres
Landtype Phase	1:24,000 or larger	<100 acres

Operationally, the higher hierarchical levels of the ECOMAP framework are not very relevant to management concerns. Domains, and Divisions and Provinces are very large, often crossing state boundaries. It is at the Sectional level that delineations may begin to become important. Certainly, Subsections and especially Landtype Associations are at the critical scale of administrative guidelines for land management. It is mainly at these levels that we have produced the delineations described below.

4. METHODS

4.1. Data Used to Delineate Map Units

We created a series of GIS layers in Arc/Info format that included the defined map area described in section 1.1.2.

Layers used include the following:

1) Thematic Mapper data subsampled at 100 m pixel resolution derived from the Wyoming Gap Analysis Project (Merrill et al. (1994)) (Fig. 1).

2) Geology from a state-wide digital product from the U.S. Geological Survey (Green and Drouillard 1994) based on a 1:500,000 map compiled by Love and Christiansen (1985) (Fig. 2).

3) Digital elevation model (DEM) data in both 3 arc second and 30 m resolutions

from the U.S. Geological Survey (1987). The 3 arc second data, when transformed to the Universal Transverse Mercator (UTM) projection, have a cell size of about 98 m and are loosely referred to as 90 m data in this report. 30 m data for about 90% of the map area were provided by the BLM State Office. Elevation can be viewed directly, as elevational belts (Fig. 3), or in terms of slope (Fig. 4), or as shaded relief (Fig. 5).

4) Mean annual precipitation data generated using algorithms developed by Daly et al. (1994) and prepared as contours of equal precipitation (Fig. 6). The original data were raster data with a cell size of about 5 km.

5) Land cover (mostly vegetation types) based on the Wyoming Gap Analysis Project digital map (Merrill et al. (1994)) (Fig. 7).

6) Hydrologic unit delineations based on a 1:500,000 map produced by the U.S. Geological Survey (1976).

7) Hydrography digital line graphs (DLG) from the U.S. Geological Survey (1989).

These layers were used interactively to compare the information in each. In general, once distinct units were identified at any hierarchical level, they were delineated with data for whichever variable was the principal controlling factor at a given arc along a polygon. This is essentially the "method of controlling variables" described by Bailey (1996) in which the appropriate controlling variable is selected to set the boundary of a particular land unit. At the scale we are mapping--Section to Landtype Association--landscape configuration was our principal basis for definition. While geology underlies landscape configurations at this scale, relief was usually the final determinant of where delineations were digitized. In fact, geological boundaries usually do not coincide with relief boundaries because erosion may have offset breaks in slope with formational contacts, but also because geological data were not as accurate as DEM-based relief data, particularly where 30 m DEM data were available.

The results of these efforts at the Landtype Association level is the Landtype Association coverage in Arc/Info format. The rationales used for each map unit delineated are described in the discussions of those units in section 5, while a detailed description of the Landtype Association coverage is presented in section 6. The arcs of the Landtype Association coverage have been attributed to indicate the source data and the digitizing criteria. For reference, a complete list of the arc attributes is presented in Table 10 of the Appendix.

4.2. Land Unit Statistics

A variety of statistics were calculated for the land units delineated in this project including statistics for area, elevation, annual precipitation, land cover, and geology. The areas of the delineated land units as determined from the Landtype Association coverage are given in Table 3 of the Appendix. The elevation statistics are presented in Table 4 of the Appendix and were calculated using 3 arc second data available from the USGS. The minimum, maximum, mean and standard deviation were determined within Arc/Info for each unique land unit by considering all elevation points within the polygon or polygons that make up the unit.

The annual precipitation statistics are shown in Table 5 of the Appendix and were calculated using data obtained from Daly et al. (1994), with a cell size of 5 km. In order to calculate the statistics, a rectangular array of sample points was established. The distance between points was arbitrarily set to the cell size for the elevation data (approximately 98 meters). This smaller cell size was used so that the Landtype Association coverage polygons could be represented reasonably well by the raster data. The precipitation data were then sampled at these points and the statistics (minimum, maximum, mean and standard deviation) for each unique land unit were calculated by considering all the sample points occurring within the polygon or polygons that make up that unit. Because of the large cell size for precipitation data, the statistical estimates of precipitation for small polygons must be regarded with caution, especially in areas that have rapid changes in elevation.

In addition to the elevation and precipitation analyses, the Landtype Association coverage was analyzed to determine the land cover types present in each polygon and the areas of these types within the polygons. These data are presented in Table 6 of the Appendix, with a description of the land cover types provided in Table 7. The areas are given in hectares and as a percent of the total area occupied by the polygon. The areas were determined by intersecting the Landtype Association coverage and the land cover coverage to obtain a coverage that has polygons with the attributes of both input coverages. Thus, a particular polygon can be selected using the Landtype Association coverage attributes and analyzed to determine information about the land cover types using the land cover attributes.

A similar analysis was also done for the geologic formations, with the results appearing in Table 8 of the Appendix. Table 9 of the Appendix provides an explanation of the codes used to represent the geologic units.

In addition to these quantitative data, surficial geology and general soil "Great Groups" are provided as part of the LTA descriptions. Surficial geology data come from a provisional map provided by Dr. Jim Case of the Wyoming Geological Survey. Soil information comes from a map published by the Agricultural Experiment Station (1977). Some LTAs contain geological formations that may be rich in selenium, a somewhat toxic element of potential importance for water-quality, forage-quality, and floristics considerations. Where such formations occur, they are indicated in the LTA descriptions from the map provided by Case and Cannia (1988) in the following manner:

"High" indicates "may be highly toxic to animals in localized areas."
"Moderate" indicates "may be moderately toxic to animals in localized areas."
"Mild" indicates "may be mildly toxic to animals in localized areas."
"Insufficient" indicates "insufficient data for classification."

In the LTA descriptions to follow, reference to selenium conditions will be made only for "high" and "moderate" conditions.

4.3. Interactions with BLM Personnel

This work benefitted from direct interaction with BLM personnel on two occasions, and from numerous telephone conversations.

20 October 1995 BLM personnel from Cheyenne, Rawlins and Rock Springs were in attendance at a presentation of this work in a Department of Botany seminar. A brief meeting of those personnel took place immediately afterward. BLM personnel attending included Jack Pederson, Roger Wickstrom, Vickie Niermeier Daniels, Jon Johnson, Gretchen Meyer, Darlene Horsey, Ron Hilton, Tom Enright, Chuck Reed and Bill McMahan.

1 November 1995 Reiners and Thurston traveled to Rock Springs with Bill Daniels, Jon Johnson and Joe Patti for presentation and discussion of the work with Rock Springs District personnel at a meeting at Wyoming Western College organized by Bill McMahan. Plots of some coverages with the land unit delineations shown were left at Rock Springs for consideration and suggestions from BLM personnel.

13 November 1995 Reiners and Driese brief Governor Geringer on southwest Wyoming work on behalf of BLM. Director Al Pierson, Bill Daniels and Jon Johnson were also present.

15 November 1995 Reiners and Thurston received suggested changes from Rock Springs BLM personnel sent on 13 November. Most of the suggestions were adopted, necessitating further digitization and complete recalculation of spatial statistics.

5. LAND AREA DELINEATIONS: RATIONALES AND DESCRIPTIONS

5.1. Overview

This portion of the report contains rationales and descriptions of the land units in hierarchical order. We first discuss the higher order ecoregion map units: one Domain, two Divisions and two Provinces. We next discuss the intermediate order ecoregion map units: eight Sections and eight Subsections. Finally, we describe the 47 Landtype

Associations (LTAs) by Section and Subsection. Many of these LTAs are represented by spatially separated polygons. In addition to the LTAs, three "Landtypes" are discussed: badlands, playas and dune fields.

The list of delineated land units appears in Table 1 of the Appendix with the units organized according to the ECOMAP hierarchy. Table 2 provides a convenient cross-listing of polygon identification numbers with the hierarchical ECOMAP Land Unit Codes.

5.2. Rationales and Descriptions of Domain, Divisions and Provinces

"Domain" is the highest hierarchical level in the U.S. Forest Service Ecoregion system (Bailey 1995). The Dry Domain is characterized by potential evapotranspiration being greater than precipitation (Bailey 1995) and covers the entire state of Wyoming. The Dry Domain is coded as "300" within this system so that all mapped units within Wyoming have a "3" as a prefix in their numerical notation. This hierarchical unit is important at the continental scale but is not relevant for purposes of ecosystem management in an area the size of Wyoming.

Within the "Dry Domain" occur seven "Divisions." The "Temperate Steppe" Division (330) includes areas "with a semiarid continental climatic regime in which, despite maximum summer rainfall, evaporation usually exceeds precipitation" (Bailey 1995). One of the Provinces of this Division occurs in eastern Wyoming but not in the map area described in this work.

A second Division within the "Dry Domain" occurring in Wyoming is "Temperate Steppe Regime Mountains (M330)" characterized by the same macroclimate of the Temperate Steppe Division but featuring changes in temperature and precipitation with changes in elevation. This Division encompasses all the mountain systems of the southwest Wyoming map area within the "Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province (M331)." In this Province,

> "The climate is a temperate semiarid stepped regime with average annual temperatures ranging from 35° to 45°F (2° to 7°C) in most of the region, but reaching 50°F in the lower valleys....Total precipitation is moderate, but greater than on the plains to the east and west. In the highest mountains, a considerable part of annual precipitation is snow, although permanent snowfields and glaciers cover only relatively small areas (Bailey 1995)".

The third Division within the Dry Domain occurring in Wyoming and in the map area is the "Temperate Desert Division (340)" characterized as areas of low rainfall but strong contrasts in seasonal temperatures (Bailey 1995). Only one of two Provinces within this Division occurs in Wyoming, the "Intermountain Semi-desert Province (342)." According to Bailey (1995), this Province is characterized by cool, semiarid climate with relatively more severe conditions at the higher elevations of Wyoming. Here,

> "Winters are cold, and summers are short and hot. Average annual temperatures range from 40° to 52°F (4° to 11°C), and the average growing season has fewer than 100 days in the south and 140 days in the north and east. Average annual precipitation ranges from 5 to 14 in (130 to 360 mm), and is fairly evenly distributed throughout the year" (Bailey 1995).

Because all three Divisions and Provinces represented in Wyoming extend beyond the state boundaries, they are represented by exactly the same map units within the state. In other words, Provinces equal Divisions within Wyoming. These are illustrated for the map area of this project in Fig. 8. Provincial boundaries are set by map area and constituent Sections boundaries. The western and southern map boundary is set by the state boundary with Idaho, Utah and Colorado. The western portion of the northern boundary is set by the Lincoln and Sublette county boundaries, and the northeastern and eastern boundary is set by the continental divide. The ultimate sources of these delineations are given in the Table 10 of the Appendix. Provincial boundaries interior to the map boundary were set by their constituent sections and will be described in those portions of this report.

5.3. Rationales and Descriptions of Sections and Subsections of the Intermountain Semi-Desert Province (342)

Domain and Province boundaries are set primarily by climatic considerations. Physiography in the sense of topographic configurations is the primary basis of delineation at the Section and Subsection hierarchical levels, particularly where distinct topographic variations occur as they do in Wyoming. The map area is necessarily an artificial unit imbedded within larger, physiographic units, and containing smaller physiographic units. Those units included in the map area marginally, and imbedded within it, are described in this section of the report. It is helpful, however, to begin these descriptions with a general overview of the terrain characteristics. The following description is derived from, and can be reviewed from numerous sources ranging from lay treatments such as Fenneman (1931), Blackstone (1988) or Lageson and Spearing (1988), to reviews such as Snoke (1993), to highly technical treatments as cited in Snoke.

Southwestern Wyoming today is essentially a large basin, termed by some the Wyoming Basin, bordered by mountain ranges. The history of mountain building beginning about 65 million years ago includes the history of fluvial deposition of erosional products, and later, aeolian deposition of volcanic products during the Tertiary Period into the inter-range areas presently comprising the basin. Between 65 and 5 million years, the basins were, at times, filled sufficiently that the area, as viewed by some, was an aggradational plain with only the highest summits revealed above the Tertiary sedimentary layers. The basins were essentially filled with weakly consolidated debris. Following regional uplift approximately 5 million years ago, erosional rates were accelerated so that the basins have become partially excavated. The present-day, regional landscape consists of partially revealed harder rocks associated with the mountains (mostly Precambrian and Paleozoic rocks), and the sandstones of Mesozoic strata that were deformed into hogbacks and cuestas associated with mountain-building. These harder rocks have been, and are being, etched from the matrix of highly erodible Tertiary materials. The Tertiary materials themselves, with some important exceptions, usually have only small degrees of difference in their erodibility so that much of the topography found within the basins is mostly derived from accidents of position with respect to headwater versus mainstem elevations, and the influence of Pleistocene glacialfluvial deposition events. Sections, Subsections and Landtype Associations described in this report and accompanying maps are defined primarily by the lithology and subsequent geomorphology of these exposed uplands and partially excavated plains.

Our treatment of this Province in Wyoming features two major differences from Bailey et al. (1994) and the provisional ECOMAP map. The first is that we do not include the Central Basin and Hills Section" in our delineations. The second is that we have created the "Great Divide Basin" (Fig. 9) as its own Section within the Intermountain Semi-Desert Province. We believe the Great Divide Basin is a singular unit within the Province because of its internal drainage together with large areas of dune field and paleo- and extant playas. Furthermore, the Great Divide Basin obviously does not drain into the Green River so it would be inappropriate to have used a nomenclature which, by implication, indicates that it is within the Green River drainage.

More generally, at least within the map area represented in this work, we find no justification for separating the Central Basin and Hills Section from the Green River Basin Section on the basis of climate, geology, land forms or vegetation within this map area. This position is actually reflected in the map unit chart in Bailey et al. (1994) in which characteristics are highly overlapping or only correct in some detailed areas.

We have organized the Wyoming portion of this Province into three Sections and six Subsections (Fig. 10). The codes for the Subsections ("342Ea" for the Bear Lake Subsection is an example) are based, when possible, on the draft map obtained from Dr. Jerry Freeouf and mentioned in section 3.

5.3.1. Bear Lake Section (342E)

The Bear Lake Section (Fig. 9) comprises the southern, lower elevation portion of the Overthrust Belt (Fig. 2). This nomenclature and general distribution follows ECOMAP. It is bounded on the west by the state boundary with Idaho and Utah, on the south by Utah, and on the east by the eastern margin of the deformed rocks and associated Tertiary slopes of the overthrust belt. It is separated from the adjacent Section, the Green River Basin Section, by the more complicated topography and geology associated with overthrust tectonics. Within Wyoming, this Section consists of only one Subsection, the Bear Lake Subsection (Fig. 10).

5.3.1.1. Bear Lake Subsection (342Ea)

This Subsection is 5,087 km^2 in area within Wyoming and ranges in elevation from 1,846 to 2,621 m. Mean and standard deviations for elevation are 2,169 and 128 m, respectively (Tables 3,4, Appendix). The physiography of this Subsection consists principally of a series of linear, narrow ridges and valleys of Paleozoic and Mezosoic formations on the eastern border, some very complicated, highly faulted hills on the western border, and a Tertiary core of highly eroded sediments referred to in some treatments as the "Fossil Syncline" because of the extraordinary fossil deposits found there. Mostly paralleling the strike of the overthrust ridges and valleys are several structural valleys of post-overthrust age.

Precipitation over the entire Subsection averages 373 mm (Table 5, Appendix). Except where harder rocks outcrop and support open woodlands of small coniferous trees, most of the area is vegetated by sagebrush steppe and is little different from the Lower Green River Basin Subsection to the east (Fig. 10). The structural valleys feature mainly irrigated and non-irrigated agriculture.

5.3.2. Green River Basin Section (342G)

This is the largest Section in the map area, consisting of 36,991 km^2 (Fig. 9). In some physiographic treatments it is termed the "Green River Basin"--a broad area of low relief lying between mountains in most directions. This Section is bounded by the Overthrust Mountains and Bear Lake Sections on the west, by the Gros Ventre and Wind River Ranges to the northeast, and by the Great Divide Basin and Sierra Madre Subsection to the east (Fig. 9). The long southern boundary is set by the state line with Utah and Colorado. This Section is subdivided into four Subsections distinguished by particular geological and topographic properties.

5.3.2.1. Lower Green River Basin Subsection (342Ga)

The Lower Green River Basin is the largest Subsection in the map area with a total area of 23,731 km^2 (Fig. 10). This is an area of relatively low relief dominated by vast expanses of Tertiary (mostly Eocene), horizontally bedded sediments reworked in places by Pleistocene glacial outwash and Holocene alluvial processes. While a relatively monotonous terrain, it holds untold mineral wealth in the form of natural gas, oil and trona, and minerals development is occurring here at a very rapid pace.

Average elevation and its standard deviation for this Subsection are 2,116 m and 149 m, respectively. The low standard deviation, only 7% of the mean for this huge area, is a measure of the low relief of this Subsection. Physiographically, this Subsection consists mainly of rolling plains and tablelands, incised in some areas by broad alluvial valleys, in others by canyons, and punctuated by occasional mesas, cuestas and recessional escarpments. Badlands and dune fields are common Land Types in this

Subsection.

Precipitation averages 272 mm per year. The single most important vegetation type is Wyoming big sagebrush; but desert shrub, greasewood and various alluvial vegetation are also common.

5.3.2.2. Rock Springs Uplift Subsection (342Gc)

The Rock Springs Uplift Subsection provides welcome topographical and ecological relief to the rest of the Green River Basin Section (Fig. 10). The uplift consists of a series of more or less concentric cuestas and hogbacks of deformed Cretaceous rocks surrounding a central valley of soft shale. The southern end of the uplift is still mantled with some extensive, heavily scalloped mesas, remnants of the vast excavation of Tertiary sediments throughout the entire area since the Miocene. This Subsection is also rich in mineral wealth and is already well developed.

This Subsection is relatively small, only 3,988 km^2 in area. Although this Subsection is an anticline, its average elevation is essentially the same as that of the surrounding Lower Green River Basin (2,133 m, std.=116 m). Precipitation averages 243 mm, even less than the average of the surrounding Lower Green River Basin Subsection. Nevertheless, the upland vegetation is more variable within the extent of the anticline because the harder, Cretaceous rocks provide a substrate for vegetation other than Wyoming big sagebrush. Juniper, and some pine occur on higher ridges and the edges of the mesas.

5.3.2.3. Washakie Basin Subsection (342Gd)

The Washakie Basin Subsection (area = 4,725 km^2) is delimited by the outer margin of a set of Eocene sediments that dip upward in all directions from the center of the basin: to the Rock Springs Uplift on the west, the Wamsutter Arch to the north, and the Sierra Madre Mountains to the east (Fig. 10). While a structural basin, this subsection averages essentially the same elevation as the Lower Green River Basin and Rock Springs Uplift Subsections with a mean elevation of 2,105 m (std.= 97 m). Precipitation averages 223 mm, still drier than the other Subsections, and vegetation is very similar as well.

This Subsection is lithologically, climatologically and vegetationally quite similar to the Lower Green River Basin Subsection. We have set it apart principally because of the unique topographic and geomorphic organization given to the constituent LTAs by the concentric formations composing the Basin, oldest on the outside, youngest in the center.

5.3.2.4. Upper Green River Basin Subsection (342Ge)

The Upper Green River Basin Subsection (Fig. 10) is distinguished from the lower basin by its slightly higher elevation, its high density of streams and rivers coming from mountains to the east and west, and the broad extent of alluvial valleys and flattened interfluves capped with Quaternary materials (Fig. 2)--possibly products of glacialfluvial events (Madole et al. 1987). This Subsection is 4,547 km^2 in area and averages 2,262 m (std.= 115 m) in elevation. Precipitation averages 382 mm/year, over 100 mm more than the other Subsections of this Section. Because of its dense stream network, considerable area is in natural and agricultural alluvial ecosystems, and because of the higher elevation and greater precipitation, much of the upland is vegetated by mountain big sagebrush rather than Wyoming big sagebrush which is so consistently representative of the rest of the section (Fig. 7). The northernmost end of this Section is rockier and hillier, and partially forested--markedly more mesic than the rest of the Green River Basin Section.

5.3.3. Great Divide Basin Section (342X)

This Section is the only hydrologically closed basin in Wyoming. The continental divide runs around this unit, setting it off from the northeastern edge of the map boundary and the Green River Basin Section to the west and south (Fig. 9). Drainage runs from the periphery to a series of lakes and playas in the center of the Basin. Only one Subsection comprises this Section.

5.3.3.1. Great Divide Basin Subsection (342Xa)

This Subsection consists of rolling plains, extensive playas and dune fields. Single and multiple cuestas occur along the northern margin and in the eastern portion of the Subsection in conjunction with a series of small ranges to the north and the Rawlins Uplift to the east (Fig. 2). Vegetation is essentially the same as that of the surrounding Subsections of the Green River Basin except for the extensive dunal and playa types.

The Great Divide Basin is 9,820 km^2 in extent, averages 2,095 m (std.= 81 m) in elevation (only slightly lower than the Lower Green River Subsection in elevation), and receives an average annual precipitation of 225 mm, about the same as the neighboring Washakie Basin Subsection to the south.

5.4. Rationales and Descriptions of Sections and Subsections of the Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province (M331)

Our treatment of the Sections and Subsections of this Province in this map area do not completely conform to those described in text by McNab and Avers (1994), or as provisionally mapped by Freeouf and colleagues of the Rocky Mountain Region of the

USFS. With respect to descriptions by McNab and Avers (1994), we follow their Sectional organization in this Province with two exceptions.

First, we contend that the Gros Ventre Mountains (our M331X) is an independent Section, rather than part of the Overthrust Mountains Section (USFS M331D). Tectonically, the Gros Ventre mountains are formed by deep-seated Laramide style faulting (Royse 1993), not the thin-skinned faulting of the overthrust belt (Royse 1993). These mountain building styles have led to quite different landscape forms.

Second, we have omitted the North-Central Highlands and Rocky Mountains Section (USFS Section M331H) in Wyoming. This Section is mainly a Colorado feature which, it might be argued, barely overlaps into Wyoming. With the exception of three small, Tertiary, basalt-capped hills, the general land form is more typical of the anticline-basin topography characterizing most of the map area. Without the larger context of this Section's extent in Colorado, there was no practical or conceptual reason to incorporate it in the map area delineated in this work.

The following portions of this report describe the bases for our delineations. Through agreement with the BLM and USFS, we did not subdivide the mountainous portions of the map area into LTAs. USFS activities in the mountains on USFS land are described by Wirth et al. (1996). Descriptive details given in the following text including areas, elevations, precipitation rates, geological composition and constituent land cover types are all derived from the data sets provided in the Appendix. The Subsection codes are based, when possible, on the draft map obtained from Dr. Jerry Freeouf.

5.4.1. Overthrust Mountains Section (M331D)

The overthrust belt is an area of thin-skinned, lateral overthrusts from west to east extending from southwestern Montana, through eastern Idaho and Utah, and into western Wyoming (Royse 1993). A series of relatively thin beds are set in overlapping sequence, sometimes at a high-angle, so that the harder rocks in the series form ridges and the softer rocks form valleys (Fig. 2). This resulting structure extends from the southern end of the Teton Range to the Utah border but elevations decline from north to south so that mountainous terrain can only be defined for approximately the northern half of this belt (Fig. 3).

The western border of this Section is artificially set by the western border of Wyoming with Idaho. The northern limit is set by the map boundary at the northern ends of Lincoln and Sublette Counties. In order to define this Section as an integral mountain mass to the east, we placed the eastern boundary at the base of slope leading up to the easternmost ridge of the belt. This slope is almost always composed of Eocene sediments, the exact identity of which varies along the full extent of the boundary. The southern limit of this mountainous Section was based on the southern limit of terrain reaching an elevation of approximately 2,500 m. The specific basis for each arc composing the lines enclosing this Section are described in Table 10 of the Appendix.

This Section consists of relatively steep, parallel ranges extending north and south along the strike of the overthrusted belts. It actually consists of two recognized mountain ranges: the Salt River Range to the west and the Wyoming Range to the east. Valleys between the ridges composing each of these two ranges are relatively narrow but the Greys River Valley dividing them is approximately 1-2 km wide. While these two ranges are geographically distinct, they are basically similar in topographical, geomorphical and ecological nature, so that we have not subdivided them into Subsections. Within the belt occurs a post-overthrust structural valley--Star Valley--which is mapped in two units. This valley is relatively flat and generally bounded by steep mountain walls. Also mapped in this Section is Palisades Reservoir, a broad reservoir of the Snake River, most of which extends into Idaho.

This entire Section is 6,863 km^2 in of which 6,494 km^2 is generalized as mountainous terrain, 366 km^2 is the Star Valley Structural Valley LTA, and 3.5 km^2 is Palisades Reservoir LTA. The mountainous terrain has an average elevation of 2,474 m (std.= 280 m); Star Valley has a mean elevation of 1,873 m (std.= 84 m). Thirty-five geological formations occur in the mountains terrain, most of them sedimentary rocks of Jurassic, Triassic, Pennsylvanian/Permian and Cretaceous ages.

5.4.2. Uinta Mountains Section (M331E)

This Section is recognized by ECOMAP as a distinct Section, mostly located in Utah. We have roughly followed the provisional outline for this Section produced by Freeouf and colleagues of the USFS. Within Wyoming, this entire Section is represented by the following subsection.

5.4.2.1. Uinta Mountains Subsection (M331Ea)

The foothills of the northern margin of the Uinta Mountains penetrate a short distance into southwestern Wyoming. These foothills contribute a substantial increase in elevation (Fig. 3), increase in slope angle (Fig. 4), and change in vegetation (Fig. 7) from the broad rolling plains and alluvial valleys to the north. Much of the topography (72% of the area) is modified by glacial events and associated mass movements of the Pleistocene.

This Section is small, only 386 km^2 in extent. The average elevation is 2,693 m (std.= 125 m), and precipitation averages 628 mm per year, 2.3 times more than the neighboring Green River Basin Subsection to the north. The Uinta Mountains are an important source of water for the Blacks Fork drainage and its associated irrigated agriculture.

5.4.3. Northern Parks and Ranges Section (M331I)

This Section has one member extending into the map area: the Sierra Madre Range in the southeast.

5.4.3.1. Sierra Madre Subsection (M331Iu)

The Sierra Madre Mountain Range is a Laramide feature and extension of the Park Range from the south in Colorado (Fig. 2). It is only a small map unit in this work (417 km^2) because of the map boundary along its crest bisected its complete width. The Sierra Madre is a reasonably high range with a maximum elevation of 3,294 m and an average elevation 2,724 m (std.= 221 m). The uplift associated with the Sierra Madre deformed rocks well to the north, just south of the Rawlins Uplift, and to the west, the edge of the Washakie Basin (Fig. 2). Consequently, it is historically responsible for many topographic features and LTAs around its periphery. The Range itself is composed primarily of Precambrian rocks. Precipitation for the Subsection averages 872 mm, the highest of any Subsection in the map area.

5.4.4. Wind River Range Section (M331J)

The map area includes the western slope of the Wind River Range (Fig. 9). Thus, as with the Sierra Madre, this map only includes about half of the range. The Wind River Range is also a Laramide feature having sedimentary hogbacks dipping northeastward on the east flank and Precambrian basement rock overhanging sedimentary formations along the thrust fault of the west flank (Brown 1993). This range includes the highest peak in Wyoming and has been heavily glaciated. In spite of its bisection by the continental divide and map boundary, this Section is reasonably large: 2,635 km^2. As with most Laramide mountain ranges, the Wind River Range is composed mainly of Precambrian rocks, with Paleozoic rocks flanking the eastern slope. Although primarily Precambrian, 23% of its extent within the map area is mapped as glacial debris of various types (Fig. 2). The lowest part of the mapped extent of the Range is 2,193 m, the highest point is 4,023 m, and the average and standard deviation of elevation are 2,959 m and 329 m, respectively. Precipitation for the Section is 649 mm.

5.4.5. Gros Ventre Range Section (M331X)

A portion of the Gros Ventre Range occurs in the far northern part of the map area (Fig. 9). This range has a complicated faulting structure but topographically features a steep escarpment on its southwest flank and tipping slopes to the northeast. Unlike the Wind River Range, it has little exposed Precambrian rock and consists primarily of gently dipping Paleozoic limestones and sandstones (Blackstone 1988) (Fig. 2). This is a small area: 433 km^2 in extent. It averages 2,764 m in elevation (std.= 237 m), however, so is only about 200 m lower, on average, than the Wind River Range to the southeast. Precipitation for this unit averages 739 mm.

5.5. Landtype Associations of the Intermountain Semi-Desert Province (342)

Within the Sections and Subsections described above, we have delineated Landtype Associations (LTAs) as described and defined in section 3 of this report. It is our view that LTAs are the most useful land units for ecosystem management and that these delineations may be the most useful to BLM land managers.

In some cases, we have delineated Landtypes (see section 3 of this report) overlapping the LTAs. These are special physiographic units (badlands, playas and dune fields) that we could not legitimately map as LTAs because there was no data source from which we could consistently digitize them. Furthermore, dune fields in particular are often very long, linear features that cross boundaries of LTAs based on other physiographic criteria. These Landtypes will be discussed and described in section 5.7.

We have strived to minimize the number of classes of LTAs in the map area, and to maintain a consistency with LTA classes designated in prior work in northeastern Wyoming. Nevertheless, there are 20 classes of LTAs in this work, plus three types of Landtypes (dune fields, badlands and playas). These LTA classes have code numbers as explained in section 6.3.2.

Landtype Associations (Fig. 11) and, in some cases, Landtypes (Fig. 12) are the smallest closed figures (polygons) that are digitized in this work. Each of these polygons represents a land unit having the highest level of homogeneity within this mapping system. Each polygon of the Landtype Association coverage is identified in two ways. The first way is a "land unit code" consisting of codes for the ECOMAP Province, Section, Subsection and LTA class. An example is "342Ea24." The first three characters indicate the Province (Intermountain Semi-Desert Province), the fourth character provides the Section (Bear Lake Section), the fifth character the Subsection (Bear Lake Subsection), and the sixth and seventh characters provide the LTA class (broken hills). A specific land unit code can apply to one or more polygons.

The second way in which a polygon is identified is a unique five digit identification number. The first two digits repeat the LTA class, while the last three digits are simply the number of that polygon based on the sequence of digitization in this work. For example, polygon ID of 24001 means that the polygon is a integral piece of terrain in the LTA class "broken hills," and it is the first polygon. The entire array of polygons is presented in hierarchical order in Table 1 of the Appendix. The same information is presented by order of polygon ID number in Table 2 of the Appendix.

LTAs in the following text are arranged within Subsections in an imperfect order extending from upland features undergoing erosion and leveling, to features occurring progressively downward along the pathways of fluvial erosion, for example, from "isolated mountains" to "canyonlands" to "rolling plains" to "lakes and reservoirs."

Quantitative descriptive information provided with the LTAs comes from Tables in the Appendix, qualitative descriptions for surficial geology come from a provisional map prepared by Dr. Jim Case of the Wyoming Geological Survey, general denotations for soils are derived from a map published by the Agricultural Experiment Station (1977), and comments on potential selenium abundance come from Case and Cannia (1988). For further description of vegetation and ecological interactions characteristic of this Province, see chapters 5-9 in Knight (1994).

5.5.1. Landtypes Associations of the Bear Lake Section (342E)

5.5.1.1. Bear Lake Subsection (342Ea)

This subsection is the southern, lower elevation portion of the overthrust belt. In general, it features Paleozoic and Mezosoic ridges and valleys on either side of a large syncline in the middle composed of highly erodible Eocene sediments. Some of the valleys have been altered by recent faulting and movement so are defined as "structural valleys."

5.5.1.1.1. Broken Hills (342Ea24)

A belt of hills running north-south and bisected by the Bear River (polygons 24001, 24002) compose this LTA. The rocks composing these hills are primarily the same that make up the higher ridges and deeper valleys of the overthrust belt to the north, but the linear character has been disrupted by fault swarms extending in many different directions (Fig. 2). With erosion having followed faults as well as lines of weaker lithology, the hills have no general conformation, forming a line of semi-isolated hills (Figs. 4,5). Our term, "broken hills" is a metaphor for the disruption of the original linear pattern of the ridges and it is a unique LTA class in this map area.

The combined area of the Broken Hills is 1,059 km^2 and the average elevation is 2,148 m (std.= 125 m). Major Formations comprising this terrain are Mesozoic rocks forming the hills and lower Tertiary rocks forming the lowlands. Mean annual precipitation is 373 mm. Vegetation is mainly Wyoming big sagebrush (68%), mountain big sagebrush (15%), xeric shrub (mahogany species) (6%) and a little bit of juniper woodland (5%). Soil parent materials consist of residuum and colluvial materials and the soils are mapped as Haploxerolls, Calcixerolls to the west and as Cryoboroll-Cryorthent mixtures in the eastern part of this LTA.

5.5.1.1.2. Channeled Hills (342Ea25)

The Channeled Hills LTA (polygons 25001, 25002, 25003) occupies most of the interior syncline of the southern portion of the Overthrust Belt. This is an area of relatively high elevation (2,224 m (std.= 96 m)), but it is composed of soft, highly-eroded, variants of the Wasatch and Green River Formations. Much of this area was part of the Eocene Lake Gosiute and local areas are famous for their rich deposits of tropical lake fossils (Blackstone 1988). The LTA is marked primarily by the characteristic pattern of very deep rills flowing in parallel from west to east (Fig. 4,5). This is a unique LTA type in this map area.

The Channeled Hills consists of an area of 2,193 km^2. It receives 407 mm of annual precipitation which supports Wyoming big sagebrush (60%) and secondarily mountain big sagebrush (23%) with a little juniper woodland (10%) on outcrops. Soils are primarily Cryoborolls and Cryothents derived from bedrock, residuum, mesas and colluvium. The vegetation is little different from surrounding LTAs; the primary feature setting off this LTA is the unusual geomorphological pattern of deeply incised rills that probably control hydrological, microenvironmental and fine-grained vegetation patterns.

5.5.1.1.3. Multiple Cuesta and Valley Complexes (342Ea51)

The southern end of the Overthrust Belt is bounded by a series of mostly Cretaceous Formations dipping to the east (polygons 51006, 51007). We have mapped these collectively as a representative of the Multiple Cuesta and Valley Complex LTA so common throughout Wyoming. The central valley running between the ridge series known as Cumberland Flats, among other names, might be considered part of this complex but we have mapped it as a structural valley (see below) based on the numerous fault lines bordering most of its margin. These long, narrow, dipping ridges of resistant rock, usually sandstone; and intermittent valleys, usually shales, are typical of this LTA class. These structural features control the topography, hydrology and vegetation patterns of ecosystems composing these areas.

This area is 806 km^2 in size, and averages 2,189 m (std.= 101 m) in elevation. Dominant formations are Frontier Sandstone (Kf, 24%), Aspen Shale (Ka, 11%), Adaville (Kav, 10%), a combination of Green River and Wasatch Formations (Tgrw, 9%) and Wasatch (Tw, 8%). Precipitation averages 310 mm per year. The surficial geology is classed as "bedrock" on which the predominant mapped soils are Torriorthents. Wyoming big sage (81%), juniper woodland (10%), desert shrub (4%) and aspen woodlands (1%) are the most common vegetation types. The most important identifying feature of this LTA is the marked parallel structure of rocky ridges and shaley valleys and the ecosystem features that reflect these differences in soils and microclimate.

5.5.1.1.4. Structural Valleys (342Ea81)

The valley of the Bear River on the western border, and Cumberland Flats near the eastern border of this Subsection have been mapped as "Structural Valleys." We are interpreting these as valleys that have been deepened by Neogene faulting as "halfgrabens" (Snoke 1993) and subsequently flattened by alluvial erosional and depositional processes. The average elevation for all of these valleys is about the same, between 1,929 and 2,192 m. The total area for all of these valleys is 1,017 km^2 but the Bear River representatives (polygons 81001, 81002, 81003) alone have an area of 618 km^2. The Bear River polygons are generally more moist, averaging, as a group, 376 mm annual precipitation. They feature considerable fluvial influences on their valley floors. Dominant geological materials are Quaternary Alluvium (Qa, 63%), Quaternary Terrace Gravel (QTg, 12%), Quaternary Gravel, Pediments and Fans (Qt, 6%) and Sage Junction Formation (Kss, 6%). Dominant surficial geology materials are alluvium and terrace deposits; dominant soils are Calciorthids and Ustifluvents. Dominant vegetation types are irrigated agriculture (42%), Wyoming big sage brush (37%) and shrub-dominated riparian (9%).

Cumberland Flats (polygon 81004) is ecologically different from the other valleys in this group. It has an area of only 399 km^2 and quite different geological substrate of mainly Hilliard Shale (Kh, 89%) (a formation having a high probability of selenium occurrence (Case and Cannia 1988)), with some Frontier Sandstone (Kf, 6%) along the edges. This valley is somewhat drier with an average annual precipitation of 313 mm and does not benefit from the irrigation influence of a major stream as do the other valleys. Residuum is the major parent material for soils, classified primarily as alkaline Torriorthents. Dominant vegetation is Wyoming big sagebrush (74%) and desert shrub (13%), but a considerable area is invested in mining and mineland reclamation (4%).

Obviously, dominant geomorphological processes are alluvial erosion and deposition oriented along the long axes of the valleys. Colluvial and fan deposition occur along the margins of the relatively steep valley walls.

5.5.1.1.5. Lakes and Reservoirs (342Ea83)

Naughton Reservoir (polygon 83007) (5.6 km^2; 2,202 m elevation) and Woodruff Narrows Reservoir (polygon 83012) (6.7 km^2; 1,964 m elevation) complete the balance of the area in this Subsection. Only lakes and reservoirs that covered 500 hectares (5 km^2) or more were mapped. These are aquatic ecosystems for which we have no further information.

5.5.2. Landtypes Associations of the Green River Basin Section (342G)

5.5.2.1. Lower Green River Basin Subsection (342Ga)

This is the largest Subsection in the map area. It contains largest number of classes of LTAs (15) (Appendix, Table 1), the largest number of LTA map units (38) and the largest single LTA unit (73001 at 14,024 km^2).

5.5.2.1.1. Isolated Mountains (342Ga21)

Two quite dissimilar land units occur within this Subsection that stand above their surrounding terrain as small, isolated mountains. Together they do not entail much area (156 km^2), but in their neighborhood they represent significant features. The first of these is Battle Mountain (polygon 21001), a flat-topped peak of 29 km^2 with and average elevation of 2,352 m (std. = 161 m). Battle Mountain is the northern-most extension of a series of small, lava-capped mountains occurring mostly in Colorado, a very small representative of the North-Central Highlands and Rocky Mountains Section (Bailey et al. 1994) which we have omitted from our treatment as discussed earlier.

Although lava-capped, as this mesa-shaped LTA was delineated it is composed principally Browns Park Fm. (Tm, 88%) with 7% Tertiary basalt flows (Tbf), and 5% Mesa Verde Fm. (Kmv). Given its elevation and proximity to the wetter corner of the map area, it is relatively moist, receiving 491 mm of precipitation per year. Land cover types in descending order of area occupied include: aspen (61%), mountain big sagebrush (34%) and mesic shrub (5%). Its surficial geology is mapped as "mesa" but the top composed of the tops of columnar lava columns and the flanks consist of colluvium. Soils include Cryoboralfs and Cryoborolls.

The second isolated mountain in this Subsection is locally named The Hogsback-Cretaceous Mountain (polygon 21007) and is located on the eastern flank of the Overthrust Belt. This is a more complicated small mountain (127 km^2) derived from complicated tectonics and consisting of many geological units (Wasatch (Twlc, 52%), Bighorn Dolomite (OC, 15%), Quaternary Alluvium (Qa, 13%), Madison Group (MD, 12%)). It stands at about the same average elevation as Battle Mountain (2,343 m (std.= 128 m)), but because of its geographic location in the lee of the Overthrust Belt, it is considerably drier, receiving an average annual precipitation of only 363 mm. Given its relative aridity, principal land cover types are Wyoming big sagebrush (92%), irrigated agriculture (5%) and mountain big sagebrush (3%). Surficial geology is mapped as bedrock and landslide materials; soils are mapped as Cryoborolls and Cryothents.

5.5.2.1.2. Granite Tors and Boulder Fields (342Ga22)

A ridge of granitic tors with a relatively steep southeastern trending slope laden with granitic boulders lies parallel to, and southwest of the Wind River Range that we have delineated as polygon 22001 and named Prospect Mountains Granite Tors and Boulder Fields. This is a relatively small (89 km^2) and low (2,359 m (std.= 110 m) feature, but in its isolation between the Wind River Range and long slope toward the Green River Basin, it affords a distinctive feature. Geological units are mapped as Oligocene-Early Eocene sediments (Toe, 74%) and the tors themselves (Granitic Rocks (Wg, 26%)), but the geological map (Fig. 2) does not represent the dense array of granitic boulders extending a great distance down the slope from the tors.

This is a cool, dry LTA (297 mm) with bare rock and aspen on the tors and mountain big sagebrush (59%) and Wyoming big sagebrush (38%) dominating the long slope to the southwest. Soils are mapped as Cryoborolls.

5.5.2.1.3. Uplands (342Ga23)

Two areas of relatively high elevation and non-distinctive terrain occur within the map area for which we could only assign the non-diagnostic term: "uplands." One of these areas, occurring within this Subsection, we have named Steamboat Mountain-Oregon Buttes Upland (polygon 23002). This is a relatively large (642 km^2) and high (2,259 m (std.= 76 m) area heterogeneous in its structural geology and terrain configuration. Admittedly, it is a "catch-all" unit that could not well be decomposed into other LTA classes. This unit is an upland for three reasons: 1) it is bounded by a cuesta extending northward from the Rock Springs uplift on the west margin, 2) it is bounded and supported by Steamboat Mountain--a lava-capped, semi-mesa on the south, and 3) it is at the headwaters of the tributaries to the Green River on the west, and to the very dry Great Divide Basin to the east. In summary, it is partially held up by resistant rocks and at the headwaters of its drainage systems.

Illustrating its miscellaneous nature, this LTA is composed of 28% Wasatch (Twm), 26% Laney Member (Tgl), 22% Tipton Shale (Tgt), 11% dunal sand (Qs) as well as four other minor units. This is a relatively dry LTA (263 mm per year) which supports the following land cover units: Wyoming big sagebrush (80%), desert shrub (6%), active dunes (5%) and shrub-dominated riparian (4%). Some geological units in this LTA may be moderately toxic with respect to selenium. Surficial geology includes bedrock, slopewash/colluvium and residuum. Soils are mapped as Torriorthents, Haplargids and Natargids.

5.5.2.1.4. Dissected Plateaus (342Ga33)

Flanked by the Sierra Madre Range on the East, supported by a large, high cuesta on the west, and capped by a relatively erosion-resistant sandstone, polygon 33001 is a relatively large (1,156 km^2) plateau which we have named the Miocene Sandstone Dissected Plateau. Dipping slightly from east to west, this plateau averages 2,326 m (std.= 119 m) in elevation. It is deeply dissected by Savery Creek running to the south, and by smaller streams breaching the flanking Mesa Verde Fm. cuesta to the west. Its northern extent is off the map area but is a recessional escarpment facing into the Sage Creek Basin. Much of the plateau surface is quite flat and the dissections are canyon-like in places (Fig. 13).

The Browns Park Fm. (Tm), a tuffaceous sandstone, is the capping material and composes 76% of the area; 10% includes the Mesa Verde Fm. (Kmv). Browns Park is also the capping material of a number of mesas lying further west in the map area. Given its elevation and position in the wettest portion of the map area, it is a relatively moist area receiving 533 mm per year. The sandstone-derived soils support mountain big sagebrush (60%), aspen (25%), mesic shrub (3%), lodgepole pine (3%), and in the more wind-swept positions, Wyoming big sagebrush (3%). Surficial geology is mainly residuum and bedrock with slopewash/colluvium forming the slopes of the deep drainages. Soils are Cryoborolls. High selenium potentials are mapped for the strata revealed in the incised valleys below the Browns Park Fm.

5.5.2.1.5. Canyonlands (342Ga34)

While modest in depth, steepness and color compared with the Canyonlands of Utah to the southwest, nevertheless terrain on the east flank of the Green River along its southernmost extent does consist of tablelands incised with a dense network of deep, steep-walled drainages that qualify the area as a canyonlands (polygon 34001). These are named Flaming Gorge Canyonlands after the well known flooded canyon of the Green River by this name. This is a large area (1,644 km^2) with an average elevation of 2,078 m (std.= 147 m). It is composed of nearly horizontally bedded members of the Green River Formation (54% Laney Member (Tgl), 28% Wilkins Peak-Tipton Shale (Tgwt)), and Wasatch Fm. (Twm, 12%). This is a dry area of the state so it only receives 253 mm precipitation per year. Dominant vegetation includes: Wyoming big sagebrush (59%), juniper woodland (27%) and desert shrub (4%). As expected of an area with high rates of erosion, surficial geology is bedrock and slopewash/colluvium while dominant soils are Torriorthents. The entire area is rated as "moderate" with respect to selenium.

5.5.2.1.6. Breaks (342Ga35)

Where the Green River bends along the western-most portion of the Green River Basin, it has cut through relatively deep Eocene sediments which, in turn, have produced some notable cliffs, and through down-cutting by the local tributaries, well-incised terrain leading to the well-entrenched Green River itself. We have classified this terrain into the LTA class "breaks" and named them the Green River Breaks at the suggestion of BLM personnel of the Rock Springs District (polygons 35001, 35002, 35003, 35004). The four polygons composing this unit total 600 km^2 in area; the average elevation is 2,147 m (std.= 70 m); and the geological units are a variable mixture, depending on polygon, of Wasatch and Green River members. This is a dry area, receiving an annual precipitation of 249 mm and supporting mainly Wyoming big sagebrush (80%) and desert shrub (17%). Surficial geology is mapped as residuum, slopewash/colluvium and terrace deposits; soils are Torrifluvents and Torriorthents.

5.5.2.1.7. Mesas (342Ga36)

Seven, isolated, flat-topped prominences in this Subsection have been classified as "mesas" (Fig. 11). Together, their total area is only 444 km^2, but they are notable features in their neighborhoods and they require special consideration for management purposes. While they rise above their surrounding landscapes, they are not particularly high in elevation themselves, their average elevations, including side-slopes are 2,420 m. Average elevation data do not reflect their mesa surfaces. Those elevations are better represented by maximum elevations in Table 4, Appendix. It is likely that all of these mesas are erosional remnants representing a single, Eocene erosion surface sloping from the Uinta Range northward toward the middle of the Green River Basin. In fact, both Black Mountain-Twin Buttes Mesa and Cedar Mountain Mesa are armored with Bishop Conglomerate, a light pink quartzite derived from the Uintas, protecting these units from erosional rates experienced by surrounding terrain.

The amount of precipitation received, and thus the nature of the vegetation found on and around these mesas depends on their elevation and location within the Lower Green River Basin. Average precipitation ranges from 289 mm to 543 mm, generally increasing with elevation and from west to east. The nature of the vegetation parallels the precipitation.

The surficial geology of these LTAs is mapped as "mesa" on the tops, "landslide" or coarse colluvium on the upper slopes, and slopewash/colluvium on the some of the lower slopes. Because they are individually small, their soils not individually mapped but in most cases, they are mesas because the materials on their top are relatively erosion-resistant. This means that "rim-rock" is likely around the mesa summit, and that the talus around the side-slopes is likely to be coarse. In a semi-arid climate, these rocky conditions favor the existence of certain woody plants such as juniper and mountain mahogany which are not found in the surrounding plains.

Black Mountain-Twin Buttes Mesa (polygon 36001) lies west of Flaming Gorge--a member of a trio of adjacent mesas (Cedar Mountain Mesa and Sage Creek Mesa) in this vicinity (Fig. 11). Black Mountain-Twin Buttes Mesa is 51 km^2 in area and averages 2,200 m in elevation. Delineations of all of these mesas are made at the bases of the prominences so that they include matric materials as well as the materials preserving the mesa tops. In this case, polygon 36001 comprises 98% Bridger Fm. (Tb) and only 2% Bishop Conglomerate (Tbi). Average annual precipitation is 289 mm. Wyoming big sagebrush (40%) dominates the top of the mesa, juniper woodland (22%) the rim, and desert shrub (28%) the lowermost fans.

Cedar Mountain Mesa (polygon 36002) is the largest (184 km^2) of this trio of adjacent mesas. Its average elevation is 2,395 m and the polygon is composed of 63% Bridger Fm. (Tb), 26% Bishop Conglomerate (Tbi) and 11% Quaternary Landslides (Qls) (colluvium). It receives 370 mm annual precipitation. The top supports Wyoming big sagebrush (63%) while juniper woodland (22%) and xeric shrub (10%) (mahogany) dominate the rim and talus slopes (Fig. 14).

Sage Creek Mountain Mesa (polygon 36007) is the smallest of this trio of mesas (16 km^2) and has an average elevation of 2,415 m. The polygon includes 53% Bridger

Fm. (Tb), 37% Quaternary Landslides (Qls) and 10% Quaternary Alluvium (Qa), although the last may be a geologic mapping error. This mesa receives 358 mm annual precipitation and supports juniper woodland (41%), xeric shrub (31%), Wyoming big sagebrush (15%) as described for the preceding two mesas.

Little Mountain Mesa (polygon 36003) is the northernmost of four mesas lying east of the Green River and within the Lower Green River Basin Subsection. It is an erosional remnant within the Flaming Gorge Canyonlands LTA representing a part of a former erosion surface capped by Bishop Conglomerate from the Uinta Range to the south. It is 101 km^2 in area, has an average elevation of 2,507 m, and is composed of 37% Wilkins Peak-Tipton Shale (Tgwt), 23% Bishop Conglomerate (Tbi), 17% Wasatch (Twm) and 11% Quaternary Landslides (Qls) (colluvium). It receives more precipitation than the previously described mesas to the west, 434 mm, which is manifested in its more mesic land cover: lodgepole pine (23%), aspen (21%), mountain big sagebrush (19%) and juniper woodland (19%).

Pine Mountain Mesa (Polygon 36004) is southeast of Little Mountain Mesa and has many of the same characteristics. It entails 34 km^2 in area; has a average elevation of 2,507 m; and is composed of 66% Cathedral Bluffs (Twc), 22% Bishop Conglomerate (Tbi), 9% Wilkins Peak-Tipton Shale (Tgwt). This is the highest of all of the Lower Green River Basin mesas (in maximum elevation as well as average) (Table 4, Appendix), as well as the wettest, receiving 543 mm annual precipitation. Consequently, Pine Mountain Mesa bears the most mesic vegetation, hence its local name--Pine Mountain. Land cover types, in descending order of coverage are: aspen (28%), lodgepole pine (24%), mountain big sagebrush (20%), mixed grass prairie (16%) and juniper woodland (11%).

Richards Mountains Mesa (Polygon 36006) is a very small unit (18 km^2) near the state boundary with an average elevation of 2,344 m. The polygon is composed of 92% Wasatch (Twm) and 8% Fort Union Fm. (Tfu). It receives 400 mm precipitation and is mapped with black sagebrush (57%) and juniper woodland (40%) as principal land cover types.

Teepee Mountains Mesa (polygon 36008) lies directly east of Richards Mountains Mesa near the state boundary. It is relatively small (40 km^2) and of comparable elevation (2,388 m) with its neighboring mesa, Richards Mountains. The polygon includes almost entirely Wasatch (Twm, 98%) This mesa receives only 391 mm annual precipitation; dominant land cover types are juniper woodland (88%) and aspen (8%).

5.5.2.1.8. Recessional Escarpments (342Ga41)

Recessional escarpments are long cliffs created by the headward erosion of relatively soft, horizontally bedded, sediments. These occur through much of Wyoming at different scales. Mesas may be said to be ringed by recessional escarpments, all badlands involve the complex headward erosion along recessional surfaces, and tablelands so prominent in the Rolling Plains and Tablelands LTA (see below) are edged with recessional erosion features. We reserve definition of "recessional escarpment" for those features that are relatively long and linear in form, entail at least 50 m in escarpment face height for most of their linear extent, and do not have extensive rampart formation typical of badlands terrain.

We have mapped only one such feature in this Subsection, the White Mountain Recessional Escarpment (polygon 41004). This feature extends from the town of Green River, curves north at the town of Rock Springs, the extends northward to a break in slope where highway 191 leaves the Killpecker Creek valley and climbs up to the basin surface to the west (Fig. 11). This is a well-known landmark because the historic Union Pacific runs along its southern base as does present-day Interstate 80.

We have delineated this LTA along its upper edge down the cliff face to a point where the basal fans have a slope of about 4°. Because of its limited lateral extent, it is a long feature of small area (57 km^2). Its maximum elevation is 2,316 m, with an average elevation of 2,071 m. Geologically, it is composed of 56% Wilkins Peak-Tipton Shale Members of Green River Fm. (Tgwt), 29% Laney Member of Green River Fm. (Tgl) and 14% Wasatch (Twm). With such a strongly erosional feature as this, surficial geology is bedrock and soils are Torriorthents. Average annual precipitation is 243 mm; dominant land cover types are basin bare rock and soil (45%), Wyoming big sagebrush (21%), desert shrub (19%) and a little juniper woodland (15%).

5.5.2.1.9. Multiple Cuesta and Valley Complexes (342Ga51)

Parallel belts of upturned geological formations are nearly ubiquitous around at least one side of each of the Laramide uplifts in Wyoming. Typically, these formations consist of mostly Cretaceous rocks of differential hardness. As a result, these upturned layers have eroded into parallel, alternating ridges and valleys. We have termed these terrains "multiple cuesta and valley complexes." Two such complexes occur in the Lower Green River Subsection comprising a total area of 1,240 km^2.

Polygon 51004, Muddy Creek Multiple Cuesta and Valley Complex, is a broad, but weakly expressed such complex covering 1,173 km^2 in the southeastern portion of the map area (Fig. 11). It is weakly expressed because of the thinness and relative weakness of the more resistant members. The ridges are poorly expressed by the Ft. Union Fm. (Tfu) along its western margin, but strongly expressed by the thin Mesa Verde Fm. Kmv) on its eastern margin. The other geological constituents (29% Lewis Shale (Kle), 10% Lance Fm. (Kl), 9% Browns Park Fm. (Tm)) do not contribute strongly to intermediate ridge formation.

The entire map unit averages 2,140 m (std.= 109 m) but in general it slopes strongly from west to east where its eastern margin forms the support for the Miocene

Sandstone Dissected Plateau previously described. Precipitation averages 324 mm; dominant land cover types are highly varied in nature reflecting the strong differences in substrate of a complex like this. They include Wyoming big sagebrush (56%), mountain big sagebrush (30%), aspen (4%) and irrigated agriculture (2%). Surficial geology is mapped as colluvium; soils are mapped as Torriorthents, Haplargids and Natargids. The Ft. Union member of this group is mapped as having moderate potential for high selenium content.

The second LTA in this class is termed The Glades Multiple Cuesta and Valley Complex (polygons 51011, 51012). This is a small area of only 67 km^2 located south of the Flaming Gorge Canyonlands along the state boundary. Its average elevation is only 2,010 m (std.= 85 m). The polygons include mostly Wasatch Fm. (Twm, 58%), Ft. Union Fm. (Tfu, 26%) and Ericson Sandstone (Ke, 5%). Precipitation is very low, 229 to 309 mm, and the vegetation is likewise relatively xeric including Wyoming big sagebrush (59%), juniper woodland (33%) and black sagebrush (7%). Dominant soils are mapped Haploborolls and Argiborolls. The Ft. Union component is mapped as having moderate potential for high selenium content.

5.5.2.1.10. Single Cuestas (342Ga52)

In contrast to the Multiple Cuesta and Valley Complex situation in which several formations are tilted upward, occasionally single formations occur as dipping hogbacks (steep angle) or cuestas (low angle) ridges. We have defined these kinds of features as "single cuestas." Two representatives of these, with a small total area of 208 km^2, occur in this Subsection.

The first is White Mountain Single Cuesta (polygon 52004), a continuation of White Mountain Recessional Escarpment. We have mapped the northern half of this escarpment as a cuesta rather than recessional escarpment because of the increase in dip at the point shown in Fig. 11. Otherwise geological characteristics are the same with Laney (Tgl, 70%) and Wilkins Peak-Tipton Shale (Tgwt, 14%) members of the Green River Formation, and some Wasatch Fm. (Twm, 14%) composing this unit. Total area of this LTA is 112 km^2; average elevation is 2,208 m (std.= 66 m); average precipitation is 254 mm; and dominant land cover types are Wyoming big sagebrush (88%), juniper woodland (9%), desert shrub (4%). Surficial geology is bedrock and slopewash/colluvium. Dominant soils are Torriorthents. The Wilkins Peak-Tipton Shale component of this feature is mapped as having moderate potential for selenium.

The second representative of this LTA is a series of cuestas in a broken line lying off the southeast corner of the Wind River Range immediately over, and created by the Wind River fault line (Fig. 2). We have named these the Wind River Fault Line Cuestas (polygon 52005). This is a small unit (97 km^2), standing at an average elevation of 2,245 m (std.= 56 m). Formations exposed by these cuestas include Wasatch (Twm, 50%), Bridger Fm. (Tb, 17%), White River Fm. (Twru, 10%) and the Laney Member of the Green River Fm. (Tgl, 10%). This is a dry location (285 mm) with predictable land cover types including Wyoming big sagebrush (68%), basin bare rock or soil (20%) and mountain big sagebrush (10%). Surficial geology is mapped as bedrock and slopewash and colluvium. Soils are Torriorthents and Haplargids.

5.5.2.1.11. Glacial Till and Outwash Hills (342Ga61)

Glacial materials extend down the valleys onto the basin along the northern flank of the Uinta Range and along much of the west side of the Wind River Range producing very distinctive rocky hills, or glacial outwash fans. The till terrain has a very distinctive "swell and swale" surface dotted with fresh boulders and sometimes, lakes, ponds and wetlands. Total area for the entire LTA class within the Lower Green River Basin Subsection is only 85 km^2.

Polygons 61003, 61004 include the Uinta Mountains Glacial Till and Outwash Hills comprising an area of 65 km^2. The hills themselves are not high but they have a relatively high average elevation of 2,490 m because of the foothill position of the Uintas. Surficial geology is mapped as glacial till and landslides. Because of the elevation, precipitation is relatively high at 528 mm leading to a relatively mesic array of land cover types including Wyoming big sagebrush (39%), mountain big sagebrush (17%), lodgepole pine (18%), aspen (11%), spruce-fir (3%) and irrigated agriculture (9%). Soils are Cryoboralfs and stony-Cryoborolls.

Polygon 61008 delineates the analogous Wind River Range Glacial Till and Outwash Hills along the western border of that Range within this Subsection. As most of these features occur in the Subsection further north, there is only a small area in this Subsection of 20 km^2. Average elevation is 2,316 m, surficial geology is glacial till, glacial outwash and alluvial fans. These are dry locations with annual precipitation of only 298 mm. Dominant vegetation is mountain big sagebrush (94%); dominant soils are Cryoborolls and Cryaquents.

5.5.2.1.12. Rolling Plains (342Ga71)

We have established three kinds of plains in this map area: 1) "rolling plains" characterized by gently rounded, broad interfluves and relatively narrow, well-terraced alluvial zones, 2) "rolling plains and alluvial valleys" where the terrain is still gently rounded but much of the area is occupied by broad alluvial terraces, and 3) "rolling plains and tablelands" where the interfluves have angular, mesa-like configurations, perhaps rolling on top, and below which, rolling plains lead to alluvial zones. Existence of tableland geomorphology depends on the climatic regime and relative erodibility of the interfluve surfaces, harder surfaces leading to more angular landscape features. High densities of broad alluvial plains depends on proximity to stream sources--the mountains. The three examples of this last class are found at the base of the Uintas, and in the apex of the Green River Basin where copious surface water flows out of both the Wyoming Range on the west, and the Wind River Range on the east. Rolling plains seem to be characteristic of surfaces composed of Wasatch Fm. materials, whereas rolling plains and tablelands seem to be characteristic of surfaces composed of Laney or Bridger members of the Green River Fm.

Within the Lower Green River Basin Subsection, the total area in "rolling plains" is 2,260 km^2. Average elevation for the four LTA units is low, naturally, at 2,150 m, and the standard deviation of these plains is likewise low as would be expected (std.= 132 m). Being low, precipitation is also low at 291 mm. These are among the most xeric of terrains in this Subsection.

Polygon 71004 delineates Killpecker Creek Rolling Plains, an area of 354 km^2 located between White Mountain Recessional Escarpment and the Rock Springs Uplift Subsection. This area averages only 2,029 m and receives only 238 mm of precipitation. Leading land cover types are Wyoming big sagebrush (44%), desert shrub (22%), basin bare rock or soil (9%) and greasewood (8%). Leading geological units are Wasatch (Twm, 65%), Quaternary Sand (Qs, 18%) and Quaternary Alluvium (Qa, 13%). Surficial geology is mapped as residuum but much of it is slopewash and alluvium. Dominant soils are Torriorthents, Haplargids and Natrargids.

The Little Snake River Rolling Plains (polygon 71005) are a small unit of only 28 km^2 lying along the Colorado border southeast of the Washakie Basin (Fig. 11). It is at a very low elevation (for Wyoming), only 1,883 m but receives 333 mm of precipitation due to its location in the southeast corner of the map area. Dominant land cover types are irrigated agriculture (56%), shrub-dominated riparian (30%) and Wyoming big sagebrush (8%). Leading geological units are Quaternary Alluvium (Qa, 82%) and the Wasatch Fm. (Twm, 18%). Surficial geology is mapped as slopewash/colluvium and terrace deposits upon which dominant soils are Torrifluvents, Fluvaquents and Halaquepts.

The Muddy Creek Rolling Plains (polygon 71006) is a narrow band of lowland running between cuestas of the Washakie Basin to the west and of the cuesta-valley complex to the east. It is an area of 309 km^2 and averages 2,033 m in elevation. It includes portions of the Wasatch Fm. (Twm, 49%), Ft. Union Fm. (Tfu, 28%) and Quaternary Alluvium (Qa, 23%). Annual precipitation is a low 256 mm but the extensive riparian zone within this map unit gives it a more mesic nature; dominant land cover types are Wyoming big sagebrush (46%), shrub-dominated riparian (16%), irrigated agriculture (13%) and saltbush (12%). Soils are mapped as Torriorthents, Haplargids and Natrargids.

A large area covering 1,568 km^2 of rather rough, rolling plains has been mapped between the southeast corner of Rock Springs Uplift and the southwest corner of the Washakie Basin as polygon 71008. Parts of this area are almost rough enough to be mapped as multiple cuesta-valley complex but the patterns are insufficiently distinct. We have named this area the Vermillion Creek-Alkali Creek Rolling Plains based on the principal drainages in the unit. Average elevation is 2,206 m; average precipitation is 309 mm; dominant land cover types are Wyoming big sagebrush (61%), desert shrub (13%) and juniper woodland (6%). The presence of juniper betrays the presence of relatively hard outcrops typical of cuestas. Leading geological units are the Wasatch Fm. (Twm, 43%), Wilkins Peak Member of the Green River Fm. (Tgw, 12%) and Cathedral Bluffs Member of the Wasatch Fm. (Twc, 9%). Surficial geology is mostly mapped as residuum and slopewash; dominant soils are Torriorthents, Camborthids and Haplargids. Parts of this LTA are mapped as having moderate selenium potential.

5.5.2.1.13. Rolling Plains and Alluvial Valleys (342Ga72)

Blacks Fork Rolling Plains and Alluvial Valleys (polygon 72001) lies north of the Uinta Mountains where a series of streams have created broad alluvial valleys in the Eocene sediments of the basin (Fig. 15). Its total area is 876 km^2 and its average elevation is 2,211 m (std.= 176 m). This LTA is composed of 60% Quaternary Alluvium (Qa), and 35% Bridger Fm. (Tb). Annual average precipitation is 343 mm and leading land cover types are irrigated agriculture (34%), Wyoming big sagebrush (30%) and basin bare rock or soil (16%), the last important because of the abundance of badlands along low recessional escarpments bordering some of the stream valleys. Surficial geology is alluvium, benches and terrace deposits and soils are Torrifluvents, Fluvaquents and Halaquepts.

A nearby, but detached, representative of this LTA class is named Henrys Fork Rolling Plains and Alluvial Valleys (polygon 72002) for the major stream through the area. It is 62 km^2 and averages 2,369 m in elevation. Quaternary Alluvium (Qa) makes up 93% of the area and Quaternary unspecified deposits (Qu) the rest. Surficial geology is mapped as terrace deposits; soils are not mapped but this area but can be inferred to be Torrifluvents, Fluvaquents and Halaquepts. Annual precipitation averages 430 mm. The principal land cover types are irrigated agriculture (73%) and mountain big sagebrush (21%), along with small amounts of aspen (3%) and basin bare rock and soil (3%).

5.5.2.1.14. Rolling Plains and Tablelands (342Ga73)

The LTA class with the greatest total area in the entire map area is "Rolling Plains and Tablelands" (14,058 km^2). Two polygons make up this LTA in this Subsection--73001 and 73002. This LTA is low in elevation (2,067 m) and has limited relief (std.= 111 m). It is a dry region (235 mm) and dominant land cover types include Wyoming big sagebrush (74%), desert shrub (14%), mountain big sagebrush (2%), irrigated agriculture (2%) and basin bare rock and soil (2%). The Laney Member of the Green River Fm. (Tgl, 36%), the Bridger Fm. (Tb, 33%), the Fontenelle Member of the Wasatch Fm. (Twg, 7%), Quaternary Alluvium (Qa, 6%), the main body of the Wasatch Fm. (Twm, 4%) and Quaternary Sand (Qs, 3%) compose the geological substrates in declining order of areal importance. Surficial geology designations include residuum, slopewash/colluvium and alluvium on which are found Torriorthents, Haplargids and Natrargids. Much of this area is mapped as "moderate" with respect to selenium.

5.5.2.1.15. Reservoirs (342Ga83)

Three reservoirs in this Subsection total 155 km^2. Big Sandy Reservoir (polygon 83001) on the Big Sandy River is 9 km^2 in size and lies at 2,052 m elevation. Flaming Gorge Reservoir is divided into two polygons (83003 and 83004). It has a total area of 114 km^2 and lies at 1,843 m, the lowest point in the entire map area. Fontenelle Reservoir (polygon 83005) is located below the westernmost bend of the Green River. It is 32 km^2 and lies at 1,986 m.

5.5.2.2. Rock Springs Uplift Subsection (342Gc)

5.5.2.2.1. Mesas (342Gc36)

The Rock Springs Uplift Subsection is an oval anticline with the southern base partially obscured by an Eocene erosional surface forming the large, scalloped-margin mesa connecting Quaking Aspen Mountain to the north and Miller Mountain to the south to which we have given the combined name Quaking Aspen Mountain-Miller Mountain Mesa (polygon 36005). This mesa is probably a part of the erosional surface forming the tops of most mesas in the southern end of the Lower Green River Subsection. This mesa is 457 km^2 in extent and has an average elevation of 2,312 m (std.= 105 m). Its maximum elevation is 2,633 m, which better approximates the mesa surface on its southern end and matches well with maximum elevations (mesa surfaces) of Little Mountain Mesa and Pine Mountain Mesa to the south.

The average precipitation for this sprawling mesa is only 274 mm and dominant land cover types are Wyoming big sagebrush (52%), juniper woodland (24%) and mountain big sagebrush (17%) along with some aspen. In declining order of areal coverage, this LTA is composed of 35% Bishop Conglomerate (Tbi), 18% Browns Park Fm. (Tm), 14% Wasatch (Twm), 8% Blair Fm. (Kbl), 8% Baxter Shale (Kba) and 8% Rock Springs Fm. (Kr). Surficial geology is mapped as residuum and bedrock. Dominant soils are Cryoboralfs, Cryothents and Cryoborolls.

5.5.2.2.2. Multiple Cuesta and Valley Complexes (342Gc51)

The Rock Springs Uplift is ringed by Cretaceous and Paleocene rocks deformed by the uplift process which, after etching softer rocks into valleys has resulted in the Rock Springs Uplift Multiple Cuesta and Valley Complex (polygon 51009). We have set the outer margin of this complex with the Paleocene Ft. Union Fm. inasmuch as it has been tilted by Cenozoic uplift and does include alternating resistant and soft layers. The inner margin has been set more or less with the contact with the Baxter Shale which forms the relatively flat, interior valley floor. This LTA is 2,828 km^2, and has an average elevation of 2,125 m (std.= 92 m), although its maximum elevation is 2,500 m.

This, too, is a dry area, receiving an annual average 237 mm. In declining order of areal coverage, the primary land cover types are Wyoming big sagebrush (67%), juniper woodland (13%), desert shrub (11%), and greasewood (3%). Geological units involved in this complex are: 27% Ft. Union Fm. (Tfu), 20% Rock Springs Fm. (Kr), 14% Almond Fm. (Kal), 11% Ericson Sandstone (Ke) and 8% Blair Fm. (Kbl). Surficial geology is mapped as bedrock and residuum, and soils are Torriorthents, Haplargids and Natrarigids. There is a moderate probability of high selenium in Ft. Union portion of the complex.

5.5.2.2.3. Rolling Plains (342Gc71)

The central valley of the Rock Springs Uplift (polygon 71007) is termed the Rock Springs Uplift Interior Basin. This is a relatively level area of 703 km^2 with an average elevation of 2,051 m (std.= 87 m), scarcely lower than the average elevation of the surrounding cuesta-valley complex. The most important geological unit in this LTA is Baxter Shale (Kba) covering 53% of the area. Other units are: 28% Blair Fm. (Kbl), 11% Quaternary Alluvium (Qa) and 9% Rock Springs Fm. (Kr).

This is a dry area, receiving only 246 mm in annual precipitation. More important, however, is the fine-textured, somewhat saline soil derived from the Baxter Shale which imposes further water stress on plants in semiarid climates. As a result, the most important land cover type are desert shrub (50%) (probably mostly saltbush), Wyoming big sagebrush (33%), shrub-dominated riparian (6%) and greasewood (6%). Surficial geology is mapped as residuum; soils are Torriorthents, Haplargids and Natrarigids. This area has a high probability of containing toxic levels of selenium.

5.5.2.3. Washakie Basin Subsection (342Gd)

5.5.2.3.1. Isolated Mountains (342Gd21)

Two erosional remnants occur in the Washakie Basin that have lost much of their original flat surfaces and can best be described as isolated mountains. Their combined area is 149 km^2. Both probably represent remnants of former Tertiary depositional surfaces that have been reduced by headward erosion along the bases of former and present erosion surfaces. Today, both are more or less linear features whose slopes are eroding into escarpments, ramparts and pillars typical of badlands features.

Flat Top Mountain (polygon 21003) is a notable landmark in the southeastern corner of Washakie Basin. It covers 98 km^2 and has an average elevation of 2,178 m (std.= 65 m). It is composed primarily of the Laney Member of the Green River Fm. (Tgl, 80%) and a little Cathedral Bluffs Member of the Wasatch Fm. (Twc, 18%).

Precipitation is only 261 mm per year; land cover consists mainly of Wyoming big sagebrush (77%) along with saltbush (8%), mixed grass prairie (6%), greasewood (5%) and desert shrub (4%). Surficial geological materials are mapped as mesa and slopewash/colluvium. Soils are only roughly mapped for the entire Washakie Basin as a single map unit. For that unit, soils are characterized as Torriorthents, Camborthids and Haplargids.

The Haystacks (polygon 21005) is an arcuate prominence in the north-central part of the Washakie Basin. It covers an area of 50 km^2 and stands at about the same average elevation as Flat Top Mountain (2,202 m (std.=53 m)). This prominence is composed almost entirely with the Washakie Fm. (Twa, 99%). Badlands are arrayed on its southern flank and are particularly spire-like on its southeastern corner (Fig. 16). Estimated precipitation is 187 mm per year, one of the lowest estimates in the map area. Major land cover types are Wyoming big sagebrush (56%) and basin bare rock and soil (44%). Surficial geological materials are mapped as bedrock and residuum; soils are the same as on Flattop Mountain.

5.5.2.3.2. Recessional Escarpments (342Gd41)

The Washakie Basin may be viewed as a series of sedimentary layers, turned up at their edges. The edge of each layer represents a step which in geological terms could be a cuesta if the layer were dipping sufficiently, or a recessional escarpment if it were essentially horizontal. Both types of step-like structures are common as arcuate features in this Subsection and it was difficult to make decisions in some cases as to which LTA class a particular "step" should be included. The following are those placed into the Recessional Escarpment class of LTA. Because these features are narrow and long, they are notable features with particular geomorphological and ecological properties, but do not comprise much area (74 km^2).

Polygon 41001 delineates the Delaney Rim Recessional Escarpment, well-known for its lovely red hues and viewing proximity to the Union Pacific and Interstate 80 route just to the north. It consists of 34 km^2 and has an average elevation of 2,140 m (std.= 72 m). The dominant geological unit is the Cathedral Bluffs Member of the Wasatch Fm. (Twc, 88%) which provides the red hues of this rim. The balance is composed of the Laney Member of the Green River Fm. (Tgl, 12%). Precipitation is estimated at only 193 mm per year and commensurately, vegetation is xeric. Dominant land cover types are Wyoming big sagebrush (43%), basin bare rock and soil (23%), saltbush (23%) and desert shrub (10%). Surficial geology is mapped as bedrock, shallow alluvium and alluvium. Soils are the same as noted for the entire basin. Soils associated with parts of the Delaney Rim are mapped as having moderate potential for high selenium levels.

Unlike Delaney Rim, Skull Creek Rim Recessional Escarpment (polygon 41003) is hidden from view except for those intrepid explorers of the center of Washakie Basin as it is located well to the south-interior part of the basin, far from any improved road.

It is 40 km^2 and stands at an average elevation of 2,084 m (std.= 35 m). It is a complex feature with multiple steps within it, and has some of the most colorful and extensive badlands, on its eastern, eroding side, that can be found in Wyoming. This recessional escarpment is composed almost entirely of the Washakie Fm. (Twa, 95%) with a little Quaternary Sand (Qs, 5%), which make up both active and stabilized dunes common throughout this Basin. Like most of this basin, precipitation is low, estimated at 207 mm per year, and land cover is mostly Wyoming big sagebrush (98%). Surficial geology is mapped as bedrock, old alluvial plain and alluvium.

5.5.2.3.3. Multiple Cuesta and Valley Complexes (342Gd51)

The total area mapped for this LTA class in the Washakie Basin is 713 km^2. Because multiple geological units are involved in this class by definition, these are relatively complex areas.

A poorly defined series of ridges along the far southeastern border of the basin have been put into this class, nearly by default. We have named it Cherokee Rim-Red Creek Rim Multiple Cuesta and Valley Complex (polygon 51002) after local map names. It entails 142 km^2 and has an average elevation of 1,956 m (std.= 45 m). Geology consists of Cathedral Bluffs Member of Wasatch Fm. (Twc, 35%), Browns Park Fm. (Tm, 28%) and Wasatch Fm. (Twm, 27%). Annual average precipitation is 293 mm; leading land cover units are Wyoming big sagebrush (85%), shrub-dominated riparian (7%) and juniper woodland (5%). Residuum and slopewash/colluvium are the mapped surficial geological types. Selenium levels may "high" in parts of this LTA.

Much more distinctive are the ridges and intermittent valleys or shelfs bounding the northwest quadrant of the Basin (polygon 51005) to which we have given the name "Northwest Washakie Basin Multiple Cuesta and Valley Complex." This is a larger area of 571 km^2 with a higher average elevation of 2,194 m (std.= 94 m). Here, the geology is complex including the Laney Member (Tgl, 25%), and Luman Member (Tglu, 13%), the Wilkins Peak-Tipton Shale Member (Tgwt, 10%), and the Tipton Shale Member (Tgt, 7%) of the Green River Fm.; together with the Cathedral Bluffs Member (Twc, 14%), the Niland Member (Twn, 11%), and the main body of the Wasatch Fm. (Twm, 9%). Annual average precipitation is estimated at 212 mm and the xeric land cover types include Wyoming big sagebrush (72%) and desert shrub (15%). Surficial geological materials include bedrock, residuum, slopewash/colluvium. Moderate selenium probabilities exist in some of the outermost valleys of this complex.

5.5.2.3.4. Single Cuestas (342Gd52)

Some ridges bounding the layers of the Basin are single rather than multiple topographic units and are mapped as single cuestas. Together two mapped single cuestas comprise 520 km^2.

Kinney Rim-Powder Rim Single Cuesta (polygon 52002) is perhaps the most magnificent single cuesta in Wyoming (Fig. 17). It is 438 km^2 in area and averages 2,203 m (std.=135 m) in elevation. Geologic units include the Laney member of the Green River Fm. (Tgl, 42%), the Washakie Fm. (Twa, 28%) and the Browns Park Fm. (Tm, 24%). Slightly more precipitation is estimated for this relatively high feature (286 mm), but the vegetation is still quite xeric: Wyoming big sagebrush (58%) and juniper woodland (36%). Mapped surficial materials are bedrock, residuum and slopewash/colluvium. This area is mapped as having "moderate" selenium occurrence potential.

Topographically of much lesser magnitude, but still a notable feature from the Muddy Creek Valley to the east is The Bluffs Single Cuesta (polygon 52003) marking the eastern border of the Washakie Basin. It is 82 km^2 and averages 2,025 m (std.= 29 m) in elevation. Dominant geologic units include the Cathedral Bluffs Member (Twc, 62%) and Main Body of the Wasatch Fm. (Twm, 22%); together with the Tipton Shale Member of the Green River Fm. (Tgt, 16%). Estimated average annual precipitation is 279 mm. Land cover consists of Wyoming big sagebrush (64%), saltbush (16%), shrub-dominated riparian (12%) and desert shrub (8%). Surficial materials are mainly residuum and slopewash/colluvium. Parts of this unit have a "moderate" potential for selenium occurrence.

5.5.2.3.5. Rolling Plains (342Gd71)

Rolling Plains make up most of the Washakie Basin, totalling 3,002 km^2. We have divided these plains into two sections: a slightly lower unit along the northern and eastern margin exterior to the innermost "step" mapped as the Delaney Rim Recessional Escarpment (Fig. 11), and a slightly higher unit west of (interior to) the Delaney rim.

The Exterior Washakie Basin Rolling Plains (Polygon 71001) cover 858 km^2 and lie at 2,046 m (std.=58 m). Parts of these plains are not so rolling, but are remarkably flat (Mexican Flats). Geologic units include the Cathedral Bluffs Member (Twc, 67%) and the Main Body of the Wasatch Fm. (Twm, 6%), the Tipton Shale Member of the Green River Fm. (Tgt, 13%) and significant amounts of Quaternary Sand in the extensive dune fields of the area (Qs, 5%). This area is very dry (210 mm) and is covered by Wyoming big sagebrush (48%), saltbush (27%), desert shrub (14%) and greasewood (10%). Surficial materials are mapped as alluvium and residuum.

The Interior Washakie Basin Rolling Plains (polygon 71003) are larger (2,144 km^2) and slightly higher in the Basin (2,105 m (std.= 60 m). This is the largest LTA in this Subsection. Geologic units include the Washakie Fm. (Twa, 55%), the Laney Member of the Green River Fm. (Tgl, 27%), and considerable Quaternary Sand (Qs, 14%) forming stabilized and active dunes. Much of this area is remarkably flat and the "rolling" topography is often of a very small magnitude. Precipitation is estimated at 208 mm. Land cover types in descending order of areal coverage are Wyoming big sagebrush (71%), desert shrub (12%) and basin bare rock and soil (11%), which might include some active sand dunes. Surficial materials are mapped as residuum, alluvium, old alluvial plain and bedrock.

5.5.2.3.6. Channeled Plains (342Gd75)

South of Flattop Mountain in the southeastern quadrant of the Washakie Basin occurs a unique landscape of gently rolling plains incised by relatively deep rills without extensive tributary systems. Much of this area could be described as "dry wash" with little riparian vegetation in the frequently flooded, usually dry streambeds. We have created a unique LTA class for this area titled "channeled plains." It is possible that a better appellation is available in the arid zone geomorphological literature. We have named this area after the dominant stream in the area as Sand Creek Channeled Plains (polygon 75001). This LTA is 266 km^2 in area and has an average elevation of 2,012 m (std.= 52 m). Geologic units include the Laney Member of the Green River Fm. (Tgl, 74%), the Cathedral Bluffs Member of the Wasatch Fm. (Twc, 14%), the Washakie Fm (Twa, 7%) and the nearly ubiquitous Quaternary Alluvium (Qa, 6%). This area benefits from its southeastern location in the map area (Fig. 6) and receives an estimated 246 mm annual precipitation, relatively high for its elevation. Still, it is well within the xeric range for this elevation being covered mainly with Wyoming big sagebrush (96%) along with small amounts of greasewood and shrub-dominated riparian. Surficial materials are mapped as slopewash/colluvium.

5.5.2.4. Upper Green River Basin Subsection (342Ge)

5.5.2.4.1. Uplands (342Ge23)

Near the very northern apex of the Green River Basin a watershed divide composed of a hilly, conglomeritic Pass Peak Fm. divides the Hoback drainage to the northwest from the Green River drainage to the south. This, together with the deeply terraced upper Hoback River watershed has been classed as a general upland and named the Pass Peak Upland (polygon 23001) for the formation creating this distinctive terrain. In fact, there is a distinct difference between the Pass Peak hilly area and the more regularly organized Hoback drainage area, but they have been lumped in the interest of simplicity.

This LTA is 504 km^2 and averages a relatively high 2,329 m (std.= 182 m). Major geologic units include Pass Peak Fm. (Tp, 65%), Quaternary Alluvium (Qa, 19%) and the La Barge and Chappo Members of the Wasatch Fm. (Twlc, 9%). This is quite a moist area receiving an annual precipitation of 583 mm. A mesic mosaic of mountain big sagebrush (37%), lodgepole pine (25%), aspen (22%), spruce-fir (7%) and shrub-dominated riparian (7%) composes the LTA. Surficial materials are glacial deposits, residuum, terrace deposits and alluvium; soils are Cryoborolls and Cryaquents. Both "high" and "moderate" potentials for selenium exist in different substrata of this LTA.

5.5.2.4.2. Mesas (342Ge36)

One of the most important characteristics of the Upper Green River Subsection is the widespread coverage by mixed Quaternary deposits over the upland terrain. These are classified as Quaternary Gravel, Pediment and Fan Deposits (Qt) and have imposed a distinctive character to all the area below the glacial deposition zone. In general, these deposits have tended to flatten the interfluves and, in at least some cases, armor the interfluve surfaces with coarse materials. As a result, the interfluves tend to retain their surfaces similarly to mesas with a strong stratum at the summit.

While these flat-topped, elongate features are common in this Subsection, one such feature, known locally as "The Mesa" (polygon 36009), is particularly apparent. It is not truly a mesa but we have adopted the local name. The Mesa is a large interfluve (137 km^2) lying between and above the confluence of the New Fork and Green Rivers. It is not very high, lying only slightly above the rest of the basin surface at 2,248 m (std.= 33 m). Geological substrate consists of the Qt type class described above (66%), and the New Fork Member of the Wasatch Fm. (Twg, 34%). Annual average precipitation is 314 mm and this simple, rocky, flat surface is dominated by Wyoming big sagebrush (100%). Surficial deposits are classified as fan deposits. This "mesa" falls within the area mapped as Torriorthents, Haplargids and Natrargids.

5.5.2.4.3. Glacial Till and Outwash Hills (342Ge61)

Lobes of coarse glacial till and fans of glacial outwash extend outward from the Gros Ventre and Wind River Ranges, comprising a total area 519 km^2. Terrains formed by these materials are classified as Glacial Till and Outwash Hills. These are very similar to those described for the Uintas and the portion of the Wind River Range bordering the Lower Green River Subsection.

The collective area for this LTA adjoining the Gros Ventre Mountains (polygons 61001, 61002) is 117 km^2. These polygons range in elevation from 2,072 m to 2,736 m. Geologic material for these polygons is mainly Quaternary Glacial Deposits (Qg, 85%), with the inclusion of some small units of other types for simplicity. Precipitation ranges from 457 to 767 mm in these polygons and the vegetation is a mesic mosaic of mountain big sagebrush (62%), aspen (5%), spruce-fir (20%) and lodgepole pine (12%). Surficial materials are glacial deposits and soils are mapped as Cryoboralfs and stony-Cryoborolls.

The collective area for this LTA adjoining the Wind River Mountains (polygons 61005, 61006, 61007, 61009) is 402 km^2. Elevations range between 2,185 and 2,639 m in these polygons. Most of the area is classified as glacial deposits (Qg, 88%), with some open water in small lakes and ponds. Conditions are dryer south of the Gros Ventre Range, annual average precipitation ranging from 284 to 446 mm. Land cover reflects that. Dominant land cover classes are mountain big sagebrush (79%), irrigated agriculture (6%), lodgepole pine (4%), open water (3%), Douglas-fir (3%) and aspen (2%). Surficial materials are classified as glacial deposits and soils as Cryoboralfs and stony-Cryoborolls.

5.5.2.4.4. Rolling Plains and Alluvial Valleys (342Ge72)

The bulk of this Subsection is Rolling Plains and Alluvial Valleys (polygon 72003) covering 3,347 km^2 in area and having an average elevation of 2,241 m (std.= 98 m). Leading geological units represented are Quaternary Alluvium (Qa, 36%), Quaternary pediment and fan deposits (Qt, 31%), New Fork Member of the Wasatch Fm. (Twg, 14%), and the LaBarge Member of the Wasatch Fm. (Twlc, 13%). Annual average precipitation is lower than for other LTAs in this Subsection (351 mm) but the area is well-watered by the abundance of streams flowing across it from both the west and the east. Major land cover types are Wyoming big sagebrush (48%), irrigated agriculture (28%), mountain big sagebrush (15%) and shrub-dominated riparian (4%). Surficial materials include residuum, fan deposits, terrace deposits, bench and alluvium. Soils on the residuum are Torriorthents, Haplargids and Natrargids; on the lower benches, fans and alluvium they are Torrifluvents, Fluvaquents and Halaquepts.

5.5.2.4.5. Lakes and Reservoirs (342Ge83)

The collective area for large lakes and reservoirs in this Subsection is 40 km^2. Four lakes, all natural, are involved. Boulder Lake (polygon 83002) is 7 km^2 in area, is at 2,241 m elevation where it receives an estimated 340 mm per year in precipitation.

Fremont Lake (polygon 83006) is the largest of these lakes at 21 km^2. It lies at 2,266 m elevation and receives an annual average precipitation of 363 mm.

New Forks Lakes (polygon 83008) is 5 km^2 in size, lies at 2,387 m elevation and receives approximately 450 mm annual precipitation.

Finally, Willow Lake (polygon 83011) is 7 km^2 in area. It is slightly lower at 2,369 m and receives an estimated 417 mm precipitation per year.

5.5.3. Landtypes Associations of the Great Divide Basin Section (342X)

5.5.3.1. Great Divide Basin Subsection (342Xa)

5.5.3.1.1. Isolated Mountains (342Xa21)

Three more or less isolated promontories occur, at least in part, in this subsection, contributing to the northeastern margin of this closed basin. As these are usually just parts of mountain units, these units might be classified differently if the map boundary did not bisect them.

Ferris Mountains (polygon 21002) is just a part of this small but rugged range bounding part of the Great Divide Basin. This particular fragment, artificially delineated by the Continental Divide, covers only 28 km^2. It has an average elevation of 2,390 m (std.= 187 m). Geologic units within the delineation include Quaternary Gravel, Pediments and Fan Deposits (Qt, 50%), Tensleep Sandstone (PM, 14%), Granitic Rocks (Wg, 11%) and Cody shale (Kc, 10%). Annual average precipitation is 332 mm; dominant land cover is Wyoming big sagebrush (64%), basin bare rock and soil (23%) and lodgepole pine (12%). The surficial materials are mapped as landslide and slopewash/colluvium, but some certainly is bedrock. Dominant soils for all three of these units fall into a zone mapped as Torriorthents. Selenium is only of moderate concern in all of these isolated mountain areas.

A fragment of the Seminoe Mountains (polygon 21004) lying within the Great Divide Basin is just 15 km^2 in area. It has an average elevation of 2,242 m (std.= 121 m), and receives an annual precipitation rate of 355 mm. Included geological units are Quaternary Alluvium (Qa, 57%), Quaternary Sand (Qs, 28%) and Metasedimentary Rocks (Ws, 11%). Land cover is mountain big sagebrush (62%), Wyoming big sagebrush (26%) and vegetated dunes (12%). Surficial materials are mapped as slopewash/colluvium.

A portion of Whiskey Peak (polygon 21006) is 40 km^2 in area, has an average elevation of 2,379 m (std.= 88 m) and receives an annual precipitation of 331 mm. Geologic units include Battle Spring Fm. (Tbs, 50%), Quaternary Sand (Qs, 13%), Quaternary Alluvium (Qa, 12%), Ft. Union Fm. (Tfu, 10%) and Lance Fm. (Kl, 8%). Land cover consists of Wyoming big sagebrush (64%), basin bare rock and soil (23%) and lodgepole pine (12%). Surficial materials are mapped as landslide, slopewash/colluvium and fan deposits.

5.5.3.1.2. Uplands (342Xa23)

Polygon 23003 is the eastern portion of the Steamboat Mountain-Oregon Buttes Upland described for the Lower Green River Basin Subsection. Characteristics are essentially the same except that the eastern portion has a recessional escarpment-badlands type of topography and is somewhat dryer. The area of this unit is 193 km^2, with an average elevation of 2,283 m (std.= 66 m) and annual precipitation of 269 mm. Geologic units include Wasatch Fm. (Twm, 26%), Laney (Tgl, 23%) and Tipton Shale (Tgt, 22%) members of the Green River Fm., Cathedral Bluffs Member of the Wasatch Fm. (Twc, 15%) and Bridger Fm. (11%). Land cover types include Wyoming big sagebrush (60%), desert shrub (19%), saltbush (11%) and basin bare rock and soil (10%). Surficial materials are residuum and slopewash/colluvium. Some included geologic formations are rated as moderate selenium occurrence.

5.5.3.1.3. Recessional Escarpments (342Xa41)

Polygon 41002 delineates a small recessional escarpment associated with a well-known badlands bearing a map name of Honeycomb Buttes. We have named it Honeycomb Buttes Recessional Escarpment for that geographic relationship. This is a very small area of 18 km^2. It is composed of 74% Cathedral Bluffs Member of the Wasatch Fm. (Twc) and 25% of Laney Member of the Green River Fm (Tgl). Annual precipitation is 260 mm; land cover includes basin bare rock and soil (62%), desert shrub (28%) and Wyoming big sagebrush (10%). Surficial materials are bedrock, slopewash/colluvium and alluvium. Soils are mapped as Torriorthents.

5.5.3.1.4. Multiple Cuesta and Valley Complexes (342Xa51)

The Bull Springs Rim Multiple Cuesta and Valley Complex (polygon 51001) extends from Whiskey Peak south to the Rawlins Uplift deformation, partially cutting off the eastern neck of the Great Divide Basin (Fig. 11). It is 285 km^2 in area and has an average elevation of 2,125 m (std.= 91 m). Geologic units include Battle Spring Fm. (Tbs, 23%), Quaternary Alluvium (Qa, 15%), Lance Fm. (Kl, 14%), Mesa Verde Fm. (Kmv, 11%), Ft. Union Fm. (Tfu, 10%), Quaternary Gravel, Pediment and Fan Deposits (Qt, 9%), and Cody Shale (Kc, 8%). Annual precipitation averages 288 mm. Wyoming big sagebrush (87%), greasewood (7%) and saltbush (6%) are the land cover types. Surficial geological materials for all of these cuesta-valley complexes are mapped as residuum, slopewash/colluvium and fans; Torriorthents best characterize the soils for all these units. Selenium occurrence is of moderate concern on some of the formations involved in some of these complexes.

A portion of the Haystack Mountains are included along the easternmost neck of the Great Divide Basin and although it consists of essentially one of the entire series of cuestas, it is classified as the Multiple Cuesta and Valley Complex (polygon 51003). The original drainage of this basin passed directly at the foot of this outer cuesta in Pleistocene time. This polygon is 67 km^2 in area and has an average elevation of 2,140 m (std.= 79 m). Because this polygon really only delineates one cuesta, the geology is simple, consisting of mostly Mesa Verde Fm. (Kmv, 89%) and adjacent Quaternary Alluvium (Qa, 8%). Average annual precipitation is 263 mm and the sparse land cover consists of Wyoming big sagebrush (63%) and basin bare rock and soil (36%).

The Rawlins Uplift Multiple Cuesta and Valley Complex (polygon 51008) is a magnificent example of this LTA class (Fig. 18). It covers 718 km^2 and has an average elevation of 2,170 m (std.= 94 m). Here, the geology is complex, involving many formations including Ft. Union Fm. (Tfu, 20%), Lance Fm. (Kl, 17%), Lewis Shale (Kle, 12%), Browns Park Fm. (Tm, 10%), Mesa Verde Fm. (Kmv, 10%), Steele Shale and Niobrara Fm. (Ksn, 7%) as well as small percentages of 12 other formations. Precipitation averages 279 mm. The complex of land cover types includes Wyoming big sagebrush (76%), desert shrub (8%), basin bare rock and soil (5%), black sagebrush

(5%), saltbush (3%) and greasewood (2%). The Ft. Union portion of this complex has a "moderate" rating for selenium.

The Table Mountain Multiple Cuesta and Valley Complex (polygon 51010) occurs in this Subsection is actually associated with the Seminoe Mountains lying mostly outside of the map area. It has an area of 33 km^2 and average elevation of 2,197 m (std.= 53 m). This small area has a relatively simple geological constitution: Mesa Verde Fm. (Kmv, 81%), Cody Shale (Kc, 9%) and Quaternary Sand (Qs, 8%). Precipitation averages 305 mm annually. Land cover is mostly Wyoming big sagebrush (99%).

5.5.3.1.5. Single Cuestas (342Xa52)

Polygon 52001 delineates one slope of Crooks Mountain which for this map area is defined as the Crooks Mountain Single Cuesta. Without interference of the map boundary, Crooks Mountain might be classified as something else. This polygon is only 32 km^2 in area. Average elevation is 2,318 m (std.= 91 m). This cuesta is composed of mostly Battle Spring Fm. (Tbs, 61%) and Crooks Gap Conglomerate (Tcg, 34%). Annual precipitation averages 300 mm; land cover includes Wyoming big sagebrush (61%) and lodgepole pine (34%). Surficial materials are mapped as slopewash/colluvium. Characteristic soils are Torriorthents, Haplargids and Rocky Outcrops.

Polygon 52006 is another unit of the Wind River Fault Line Cuestas described in the descriptions of LTAs in the Lower Green River Subsection. The area of this unit is 9 km^2, with an average elevation of 2,334 m (std.= 27 m) and annual precipitation of 377 mm. Geologic units include the Cathedral Bluffs Member of the Wasatch Fm. (Twc, 43%), Browns Park Fm. (Tm, 40%) and Bridger Fm. (Tb, 14%). Land cover types include basin bare rock and soil (64%) and Wyoming big sagebrush (36%).

5.5.3.1.6. Rolling Plains (342Xa71)

The majority of the Great Divide Basin Subsection is delineated in polygon 71002 named the Great Divide Basin Rolling Plains. This is the second largest LTA polygon in the map area totalling 8,384 km^2. The basin is relatively low, averaging 2,079 m with the standard deviation of 61 m representing less than 3% of the mean, illustrating a very low relief over the entire area. For such a vast area, many geologic units are represented, although most at very low percentages (Table 8, Appendix). Leading contributors are the Wasatch Fm. (Twm, 26%), Battle Springs Fm. (Tbs, 24%), Quaternary Sand (Qs, 15%), Quaternary Playa Lake and other Lacustrine Deposits (Ql, 9%), Quaternary Alluvium (Qa, 7%), Cathedral Bluffs Member of the Wasatch Fm. (Twc, 5%) and Ft. Union Fm. (Tfu, 4%). Most of the basin has surficial materials mapped as residuum, but a considerable portion is in old alluvial plain and playa deposits. In the western two-thirds of the basin, soils of the plains are mapped as Torriorthents, Camborthids and Haplargid. In the eastern one-third, Torripsamments and Torriorthents, Haplargids and

Natrargids are mapped. Selenium is of little concern over most of these plains. Average annual precipitation is 215 mm; land cover types include the inevitable Wyoming big sagebrush (65%), greasewood (15%), desert shrub (12%), saltbush (3%), vegetated dunes (2%) plus minor components of six others.

5.6. Landtype Associations of the Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province

General information on vegetation and ecological interactions at landscape scales in this Province can be found in chapters 10-13 in Knight (1994).

5.6.1. Overthrust Mountains Section (M331D)

5.6.1.1. Subsections: none delineated

5.6.1.1.1. Mountainous Terrain (M331D-11)

"Mountainous Terrain" is a pseudonym for terrain that has not been analyzed and segmented into areas of like properties. This work has not been done as it is not a part of the work order, and it is expected that mountainous terrain, almost all of which is in the hands of the U.S. Forest Service, will be mapped by that organization. Nevertheless, it will be characterized briefly here.

Polygons 11002, 11003 and 11004 delineate mountainous terrain in the Overthrust Mountains Section. This is an area of 6,494 km^2 averaging 2,474 m in elevation. Minimum elevation is 1,716 m and maximum elevation is 3,414 m. The standard deviation of elevation (280 m) is 11.3% of the mean elevation, the highest quotient in the map area indicating the ruggedness of these very steep-sloped mountains. This area is composed of two, parallel, north-trending ranges, the Salt River Range on the west and the Wyoming Range. These are well-watered mountains with an average annual precipitation of 788 mm per year, varying, of course, with elevation. Geology is very complex; the general structure is discussed in section 5.4.1. Lithologic details are recorded in Table 8 of the Appendix. Surficial geologic materials are mapped as bedrock and landslide. Soils are lumped as Cryoboralfs and stony Cryoborolls. Selenium is not an issue here.

Land cover for these mountains is relatively mesic at a given elevation compared with mountains in central Wyoming. Furthermore, it occurs in a very fine-grained mosaic that is not adequately captured by the more generalized patterns revealed in Fig. 7. This fine-grainedness to the terrain probably results from extreme steepness of the upper slopes, and the distribution of long-lasting snowbanks (Fig. 19). While the land cover data do not capture the grain of the mosaic, it does capture the types and approximate distributions in terms of areal coverage. Nineteen types are listed in Table 6 of the Appendix but only those contributing down to 5% are listed here: lodgepole pine (30%), subalpine meadow (13%), mountain big sagebrush (12%), spruce-fir (10%), aspen (10%), Douglas-fir (7%), Wyoming big sagebrush (5%) and alpine bare rock and soil (5%).

5.6.1.1.2. Structural Valleys (M331D-81)

Star Valley is disconnected into two sections represented by polygons 81005 and 81006. While this valley is underlain by relatively erodible rock, it has been deepened and east-wall slopes steepened by Neogene faulting. This, like other structural valleys of the Province, is a half-graben (Snoke 1993) flattened by alluvial side-cutting and deposition. This is a seismically active area, but an extremely rich one from an agricultural point of view.

This LTA is 366 km^2 in area and lies at and average elevation of 1,873 m (std.= 84 m). Surficial materials are slopewash/colluvium along the east valley wall and alluvium elsewhere. Geologic units are primarily Quaternary Alluvium (Qa, 85%), Teewinot Fm. (Tte, 10%) and Quaternary Gravel, Pediment and Fan Deposits (Qt, 2%). Soils are classified as Cryoborolls and Croaquolls. Annual precipitation is 486 mm--high for a valley location in Wyoming. Land cover in this rich, agricultural valley is irrigated agriculture (55%), non-irrigated agriculture (31%), aspen (6%), forest dominated riparian (4%) and shrub dominated riparian (2%). This is not a selenium-rich area.

5.6.1.1.3. Lakes and Reservoirs (M331D-83)

As the Snake River leaves Wyoming to flow into Idaho, it is backed up in Palisades Reservoir, delineated here as polygons 83009 and 83010. The section of the reservoir in Wyoming is only 3.5 km^2 in area. It lies at an elevation of 1,718 m.

5.6.2. Uinta Mountains Section (M331E)

5.6.2.1. Uinta Mountains Subsection (M331Ea)

5.6.2.1.1. Mountainous Terrain (M331Ea11)

The portion of the Uinta Mountains overlapping into Wyoming in the southwestern corner of the state is delineated in polygon 11006. It is only 386 km^2 and ranges in elevation from 2,311 to 2,962 m, with an average elevation of 2,693 m (std.= 125 m). Before the Pleistocene, this area was probably high remnants of the Eocene land surface that extended out into the Green River Basin, still represented by the mesas described earlier. Since the Pleistocene, most of this area has been veneered with materials of glacial origin. Leading geological units are Quaternary Landslide (Qls, 46%), Undivided Surficial Deposits (Qu, 18%), Glacial Deposits (Qg, 9%), Bridger Fm. (Tb, 8%), Wasatch Fm. (Twm, 6%), Quaternary Alluvium (Qa, 6%) and Bishop Conglomerate (Tbi, 5%).

Annual precipitation averages 628 mm for the area and lodgepole pine (51%), aspen (29%), mountain big sagebrush (8%), Wyoming big sagebrush (4%), logged conifer (2%) and juniper woodland (2%) are the leading land cover types. Surficial materials are mapped as bedrock, glacial deposits, mesa, and landslides. Soils are mapped as Cryoboralfs, Stony Cryoborolls, Haploborolls, Argiborolls and Rock Outcrops.

5.6.3. Northern Parks and Ranges Section (M331I)

5.6.3.1. Sierra Madre Subsection (M331Iu)

5.6.3.1.1. Mountainous Terrain (M331Iu11)

The west slope of the Sierra Madre Range forms the southeast boundary unit of the map area (polygon 11005). The western boundary of this unit roughly follows the contact of Precambrian rock with the Browns Park Formation (Tm), which composes the adjacent Miocene Sandstone Dissected Plateau. By this delimitation, the area is 417 km^2, with an average elevation of 2,724 m (std.= 221 m) and rugged relief (std.= 8.1% of the mean). Geology is very complex, Precambrian rock with a small amount mapped as Quaternary Glacial and Alluvial deposits. Surficial geology is mapped as bedrock, residuum, glacial deposit and colluvium/slopewash. Soils are mapped as Rock Outcrop, Cryoboralfs and Cryoborolls.

This is a well-watered area due to its elevation and its regional location (Fig. 6). Average annual precipitation is 872 mm, the highest in the entire map area. Land cover types in descending order of areal coverage are lodgepole pine (40%), aspen (25%), spruce-fir (23%), mountain big sagebrush (6%), subalpine meadow (5%) and logged conifer (1%).

5.6.4. Wind River Range Section (M331J)

5.6.4.1. Subsections: none delineated

5.6.4.1.1. Mountainous Terrain (M331J-11)

The Wind River Range is Wyoming's largest and highest mountain range, but only the western half is represented in this map area (polygon 11007). This brief description should not be taken to represent the entire range. This polygon is 2,635 m in area. Elevation ranges from 2,194 to 4,023 m. The standard deviation of elevation is 329 m which is 11.1% of the average of 2,959 m, the second highest coefficient of variation in the map area reflecting the ruggedness of this terrain. Virtually all of the polygon has been glaciated; the topography has been highly modified by glacial action and considerable area is still bare rock. The geology of this part of the range is extremely complex, containing 32 different units. Suffice it to say here that most of the area is variations of Precambrian rocks, much of the rest is glacial deposits, but those too are derived from the Precambrian rocks. The rocks are very hard and resistant to weathering and erosion. Surficial materials are mapped as bedrock, glacial deposits, landslide and slopewash/colluvium. Soils are mapped as Rock Outcrop, Cryoboralfs and Cryoborolls although if the three types were actually mapped, a larger share of this Range would probably be in Rock Outcrop than in other mountains of Wyoming.

Given its high elevation, this is not a particularly wet mountain range, receiving, on average, only 649 mm per year, less than the Sierra Madre, Gros Ventre and Overthrust Belt Mountain Ranges. The combination of low precipitation, particularly in the summer, infertile soils derived from mainly crystalline rocks, leads to a relatively scant and xeric array of land cover types. Cover types are lodgepole pine (49%), subalpine meadow (23%), alpine bare rock or soil (10%), aspen (6%), mountain big sagebrush (5%), spruce-fir (2%) and logged conifer (1%). It is notable in this range how much of the area is in alpine bare rock or soil and subalpine meadow, and how little area is in spruce-fir.

5.6.5. Gros Ventre Range Section (M331X)

5.6.5.1. Subsections: none delineated

5.6.5.1.1. Mountainous Terrain (M331X-11)

Only the southern portion of the Gros Ventre Range (polygon 11001) is included in the map area so this description does not represent the entire Range. The total area of polygon 11001 is 433 km^2. Elevation ranges from 2,194 m to 3,536 m in this polygon, and averages 2,764 m. The standard deviation of elevation is only 8.6% of the mean elevation of 2,764 indicating the lesser ruggedness of this terrain compared with the Overthrust Belt Mountains and the Wind River Range. Like the Overthrust Belt Mountains to the west, this is mainly a sedimentary rock-based range. Seventeen geologic units are listed in Table 8 of the Appendix and the area is relatively evenly divided between types. Geological units comprising at least 5% of the area include Phosphoria Fm. (Pp, 20%), Tensleep Sandstone (PM, 16%), Nugget Sandstone (JTrnd, 14%), Quaternary Glacial deposits (Qg, 12%), Madison Limestone (MD, 10%) and Chugwater Fm. (Trcd, 9%). Soils are mapped as Cryoboralfs, Cryoboralls and Rock Outcrops, but these designations cannot reflect the higher fertility of soils derived from these sedimentary units compared with Precambrian rocks dominating many of the other ranges. In fact, this range is notable for the extremely high floristic diversity within it, probably due, in part, to the rich and varied range of soils here. Selenium has a "moderate" possibility of occurrence in this Range.

This is the second wettest Range in the map area, after the Sierra Madre, receiving an average of 739 mm per year. Given the geologic character and abundant precipitation, land cover types are relatively mesic for a given elevation. They include

32% lodgepole pine, 23% subalpine meadow, 16% spruce-fir, 11% mountain big sagebrush, 11% aspen, 6% alpine bare rock and soil and 1% logged conifer.

5.7. Special Landtypes of the Intermountain Semi-Desert Province

Three geomorphic features are common in part of the Intermountain Semi-Desert Province within this map area. These are badlands, dune fields and playas. Because these units:

1) are widely distributed,
2) come in a wide range of sizes including very small,
3) spatially transcend LTAs defined by structural geology and larger scale geomorphic features, and
4) are not adequately mapped,

we have not included them as LTAs. It could be argued that they are equivalent to other features defined as LTAs here, but we were unable to map them with the same level of certainty as for the others. As an imperfect measure, we have expediently termed them "Landtypes" (see section 3) and have produced two separate coverages showing their distribution as best we were able (Fig. 12). The two coverages, one for badlands and the other for dune fields and playas, are detailed in section 7.

These are important map units from a management viewpoint and although inadequately represented in this work, have been, and will be, treated separately in land management planning.

5.7.1. Badlands

Badlands inevitably start along recessional escarpments of poorly consolidated, fine-grained sedimentary beds and extend downslope as a series of eroding cliffs, ramparts, pillars and fans. They typically bear little vegetation and are highly active in their geomorphic processes. Badlands are scattered throughout the Intermountain Semi-Desert Province but are particularly abundant on the Bridger Fm. in the Lower Green River Subsection, and in the Washakie Basin Subsection (Fig. 12). Our delineations of the badlands are based on the basin bare rock and soil polygons of the land cover coverage, with modifications and deletions made based on 30 m shaded relief. The resulting polygons cover some 736 km^2, a figure that we believe significantly underestimates the true extent of badlands in southwestern Wyoming. These are beautiful landscape features (Fig. 20) that deserve better delineation, appreciation in their own right, and careful management consideration.

5.7.2. Dune Fields

Dune fields delineated in the state geology map (Fig. 2) far underestimate the extent of these features. Many dunal areas are vegetated and therefore difficult to detect with coarse survey imagery, and of small area. As a consequence, they have not been adequately represented in map records. For this landtype, we have extracted all polygons classified as Quaternary Dune Sand and Loess (Qs) directly from the geology coverage. The mapped dune fields are quite extensive and cover an area of 2380 km^2. Even so, we believe the delineations in Fig. 12 grossly underrepresent dune fields in southwestern Wyoming.

Dune fields are very important land units from hydrological, rangeland and wildlife viewpoints. They have a surprisingly high density of open water, both ephemeral and perennial (Fig. 21). Not all dunes are composed of sand. Some, particularly hummock dunes in greasewood playas, are mainly composed of silt. It would be desirable to generate a better map of dunal terrains for southwestern Wyoming but criteria would have to be set for classes of dune fields (scattered dunal hummocks versus continuous dune sheets) and for minimum mapping areas.

5.7.3. Playas

Playas are not as widespread as badlands and dune fields in southwestern Wyoming and occur almost entirely within the Great Divide Basin. Some greasewood flats are probably historical playas dating back to the fairly recent drainage of Lake Wamsutter (Grasso 1990). Others represent ephemeral or occasional lakes, while some are margins of perennial lakes. For the playa Landtype, we have extracted all polygons classified as Quaternary Playa Lake and other Lacustrine Deposits (Ql) directly from the geology coverage (Fig. 2). The total area mapped as playas in Fig.12 is 801 km^2.

6. DETAILS OF THE LANDTYPE ASSOCIATION COVERAGE

6.1. General Information

Coverage description:

The Landtype Association coverage maps southwest Wyoming at the Landtype Association level of the ECOMAP hierarchy (see section 3), except in the mountains, which are mapped only to the Section or Subsection level. The Landtype Associations are represented by single and multiple polygons. The polygons and lines are attributed so that any level of the hierarchy can be selected. The lines are also attributed to indicate the source GIS layer or background display for on-screen digitizing and the criteria for the delineation.

Coverage name: ecounit

Coverage size: 576 Kbytes

Date of last revision: 20 Dec 95

6.2. Arc/Info Description

```
                 Description of SINGLE precision coverage ecounit

                                  FEATURE CLASSES

                                      Number of  Attribute      Spatial
Feature Class            Subclass     Features   data (bytes)   Index?   Topology?
-------------            --------     ---------  ------------   -------  ---------
ARCS                                        522       136
POLYGONS                                    102       104                Yes
NODES                                       433

                                 SECONDARY FEATURES

Tics                                        209
Arc Segments                              51332
Polygon Labels                              101

                                     TOLERANCES

Fuzzy    =                  4.000 V          Dangle  =               100.000 V

                                 COVERAGE BOUNDARY

Xmin =                        -8623.339      Xmax =                  343336.156
Ymin =                      4540531.500      Ymax =                 4824643.000

                                       STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

                            COORDINATE SYSTEM DESCRIPTION

Projection                    UTM
Zone                           13
Datum                       NAD27
Units                      METERS            Spheroid      CLARKE1866
Parameters:
```

6.3. Polygon Attributes

6.3.1. Items

```
COLUMN    ITEM NAME           WIDTH OUTPUT  TYPE N.DEC  ALTERNATE NAME      INDEXED?
     1  AREA                      4     18    F      3                          -
     5  PERIMETER                 4     12    F      3                          -
     9  ECOUNIT#                  4      5    B      -                          -
    13  ECOUNIT-ID                4      5    B      -                          -
    17  MCODE                     1      1    C      -                          -
    18  PCODE                     3      3    I      -                          -
    21  SCODE                     1      1    C      -                          -
    22  SSCODE                    1      1    C      -                          -
    23  LTACODE                   2      2    I      -                          -
    25  LTANAME                  80     80    C      -                          -
     **   REDEFINED ITEMS     **
    17  LUCODE                    8      9    C      -                          -
```

6.3.2. Item Definitions

ECOUNIT-ID	This field contains the user-assigned polygon ID number. Each polygon has a unique five digit number, the first two digits of which are equal to the two digit Landtype Association code (LTACODE). Figure 11 shows the polygons of the Landtype Association coverage shaded according to LTA type, with polygon IDs displayed for each polygon.
MCODE	This field is either blank or contains an M to indicate mountains.
PCODE	This field contains a three digit code to indicate the province.
SCODE	This field contains a single uppercase letter (A, B, C, ...) to indicate the section.
SSCODE	This field contains a single lowercase letter (a, b, c, ...) to indicate the subsection.
LTACODE	This field contains a two digit code to indicate the Landtype Association.

Code	Landtype Association
11	Mountain (not subdivided into lta's)
21	Isolated Mountain
22	Granite Tors and Boulder Fields
23	Upland
24	Broken Hills
25	Channeled Hills
33	Dissected Plateau
34	Canyonland
35	Breaks
36	Mesa
41	Recessional Escarpment
51	Multiple Cuesta and Valley Complex
52	Single Cuesta
61	Glacial Till and Outwash Hills
71	Rolling Plains
72	Rolling Plains and Alluvial Valleys
73	Rolling Plains and Tablelands
75	Channeled Plains

81	Structural Valley
83	Lake/Reservoir

LTANAME This field contains a place name along with the name of the Landtype Association class.

LUCODE This redefined item can be used to select specific polygons using the complete land unit code. An example of a land unit code is ' 342Ea25'.

6.3.3. Sample Records from the Polygon Attribute Table

```
                  3
AREA                          =      2635222016.000
PERIMETER                     =    408326.531
ECOUNIT#                      =      3
ECOUNIT-ID                    = 11007
MCODE                         = M
PCODE                         = 331
SCODE                         = J
SSCODE                        = -
LTACODE                       = 11
LTANAME                       = Wind River Range

                 40
AREA                          =       135496448.000
PERIMETER                     =     77320.430
ECOUNIT#                      =     40
ECOUNIT-ID                    = 25003
MCODE                         =
PCODE                         = 342
SCODE                         = E
SSCODE                        = a
LTACODE                       = 25
LTANAME                       = Overthrust Belt Channeled Hills
```

6.4. Line Attributes

6.4.1. Items

```
COLUMN   ITEM NAME           WIDTH OUTPUT  TYPE N.DEC  ALTERNATE NAME     INDEXED?
    1  FNODE#                    4      5     B     -                            -
    5  TNODE#                    4      5     B     -                            -
    9  LPOLY#                    4      5     B     -                            -
   13  RPOLY#                    4      5     B     -                            -
   17  LENGTH                    4     12     F     3                            -
   21  ECOUNIT#                  4      5     B     -                            -
   25  ECOUNIT-ID                4      5     B     -                            -
   29  TYPE                      4      5     I     -                            -
   33  SOURCE                    4      5     I     -                            -
   37  NOTE                    100    100     C     -                            -
```

6.4.2. Item Definitions

ECOUNIT-ID This field contains the user-assigned arc ID number. Each arc has a unique four digit ID assigned by setting the user ID equal to the internal

Arc/Info ID number plus 1000.

TYPE This field contains a one or two digit code that indicates the line type.

Code	Line Type
1	Domain
2	Division
3	Province
4	Section
5	Subsection
6	Landtype Association
11	County Boundary
12	State Boundary
21	Project boundary along continental divide

SOURCE This field contains a three digit code that indicates the source GIS layer for the arc or the background display used for on-screen digitizing.

Arcs copied directly from specified coverages

Code	Source Coverage
101	County boundaries
105	Hydrologic units
106	Geology
107	Hydrography
108	Land cover

Arcs digitized on-screen with the specified background displays. Arcs have been manually smoothed.

Code	Background Display
202	Geology
204	Streams
205	30 m shaded relief
206	90 m shaded relief
207	30 m shaded relief with hatched geology following relief using geology as a guide
208	30 m shaded relief with hatched geology following geology primarily
209	90 m shaded relief with hatched geology following geology primarily

212	30 m shaded relief with streams
214	30 m shaded relief with hatched vegetation following relief using vegetation as a guide
215	No background
216	100 m thematic mapper (4,5,3 (RGB))
217	30 m dem (shaded)
218	30 m shaded relief with elevation contour following relief using elevation as a guide
219	90 m shaded relief with hatched geology following relief using geology as a guide
224	90 m shaded relief with streams
225	60 m slope (shaded in 1 degree intervals between 0 and 10 degrees)
226	30 m shaded relief with slope contour (at 3-4 deg) following relief using contour as a guide
227	30 m shaded relief guided by 60 m shaded relief calculated from 60 m dem data reclassified into 50 m intervals
228	30 m shaded relief guided by 3-4 degree slope angle

NOTE This field contains a comment concerning the source of the arc or the criteria used when digitizing the arc.

Table 10 of the Appendix includes the complete set of line attributes for the Landtype Association coverage to be used in conjunction with Figures 22 and 23, which show the arcs of the Landtype Association coverage labeled with their user ID numbers.

6.4.3. Sample Records from the Arc Attribute Table

```
                  1
FNODE#                          =      2
TNODE#                          =      1
LPOLY#                          =      3
RPOLY#                          =      1
LENGTH                          =      12032.024
ECOUNIT#                        =      1
ECOUNIT-ID                      =   1001
TYPE                            =     11
SOURCE                          =    101
NOTE                            = county boundary from counties coverage

                  5
FNODE#                          =      3
TNODE#                          =      7
LPOLY#                          =      4
RPOLY#                          =      2
LENGTH                          =      6540.981
ECOUNIT#                        =      5
ECOUNIT-ID                      =   1005
TYPE                            =      2
SOURCE                          =    206
NOTE                            = follows base of slope on west side of green river
```

6.5. Map Accuracy

There are many factors that affect the accuracy of the delineations in the Landtype Association coverage and also the Landtype coverages discussed in section 7. The main source of error (or uncertainty) is the judgement on our part as to what units should be mapped and the criteria for delineating these units. For each map unit, there was a multitude of decisions to be made. Someone else, using their best judgement, might come up with lines that deviate significantly from ours.

A second source of error is the error associated with the GIS layers used in making the delineations. Table 3 shows the main layers that were used and an estimate of the horizontal accuracy for each layer. Some of the arcs in the Landtype Association coverage were taken directly from the coverages in Table 3, so the errors associated with these arcs carried over to the Landtype Association coverage. Other arcs were digitized on-screen with a variety of background displays. In this case, there was not only the error associated with the GIS layer used for the background display, but also a digitizing error. The most common background display was shaded relief using 30 m data, with the display zoomed to a scale of about 1:24,000. When there were distinct topographic features to follow, the lines drawn were within 1 to 2 pixels of the desired location (30-60 m with 30 m DEM data). When the features were less distinct, the position of the line involved more judgement. Often, selected geology polygons were displayed on top of the shaded relief with hatched patterns to guide the digitizing. In this situation, the horizontal accuracy could vary significantly depending on whether the delineation closely followed the relief or the geology.

Since the accuracy associated with a given delineation depends on many factors and since these factors may vary for different parts of the delineation, it is difficult to specify a single number that reflects the true accuracy situation. Lines based on distinct features visible in the 30 m shaded relief displays are going to be more accurate than lines based on 90 m data or lines based on the geology coverage or the hydrologic units coverage. In an effort to document the source/criteria for each delineation and to provide some sense of accuracy, the arcs in the Landtype Association coverage were attributed with a 3-digit code in the SOURCE field. A list of these codes is presented in Section 6.4.2. Codes ranging from 101 to 199 indicate lines obtained directly from other coverages, while codes from 201 to 299 indicate lines digitized on-screen with the specified background display. In addition to the SOURCE field, each arc has a NOTE field that contains a brief description of the criteria used in making the delineation. Table 10 in the Appendix contains a list of these delineation notes for the arcs of the Landtype Association coverage. Figures 22 and 23 show the arcs of the Landtype Association coverage labeled with the user ID numbers, which relate the arcs to the information in Table 10.

Table 3. Estimates of the horizontal accuracy of the GIS layers used in the delineations of the Landtype Association coverage.

GIS Layer	Horizontal Accuracy Estimate [m]	See Note	Other Comments
Counties	±50	1	Digitized from 1:100,000 source materials
DEM (7.5-minute)	±15	2	30 m cell size
DEM (1°X2°)	±100	2	Approximately 90 m cell size
Geology	±700	3	Digitized from 1:500,000 source materials
Hydrography	±50	2	USGS 1:100,000 digital line graphs (DLG)
Hydrologic units	±700	4	Digitized from 1:500,000 source materials
Land Cover	±250	3	Derived from 100 m thematic mapper data
Thematic mapper	±200	3	Original data were not terrain corrected and were resampled to 100 m

Notes

1. Accuracy estimate based on the assumption of a 0.5 mm digitizing error.

2. Accuracy estimate from the "Geo-Positioning Selection Guide" developed by the U.S. Department of Interior, Bureau of Land Management (U.S. Government Printing Office: 1992-676-687).

3. Accuracy estimate based on a comparison of the positions of large lakes and reservoirs and major rivers in the GIS layer with the positions of the corresponding features in the USGS 1:100,000 hydrography DLG coverage.

4. Accuracy estimate based on a comparison of the line along the Continental Divide in the Wind River Range with the corresponding line in the counties coverage, which forms the boundary between Sublette and Fremont counties.

In view of the uncertainties associated with the delineations, it may be helpful to think of the lines as fuzzy lines with varying widths that depend on the many factors affecting accuracy, with the possibility that the position and widths of these lines may significantly change as judgement evolves or better data become available.

7. DETAILS OF THE LANDTYPE COVERAGES

7.1. General Information

7.1.1. Dune Fields and Playas Coverage

Coverage description:

The dune fields and playas coverage maps the Dune Sand and Loess (Qs) and the Playa Lake and Other Lacustrine Deposits (Ql) in southwest Wyoming. These features were taken directly from the geology coverage. The features are represented by multiple polygons and are considered Landtypes in the ECOMAP hierarchy (see section 3). The polygons are attributed with a Landtype code that allows a specific class of landtype polygons to be selected. The other polygon attribute codes associated with the ECOMAP hierarchy and used in the Landtype Association coverage are not present. The arcs are attributed in the same way as the arcs in the Landtype Association coverage.

Coverage name: dunes-playas

Coverage size: 203 Kbytes

Date of last revision: 1 Feb 96

7.1.2. Badlands Coverage

Coverage description:

The badlands coverage maps the badlands in southwest Wyoming. The delineations are derived from basin exposed rock/soil polygons from the land cover coverage, with modifications made based on 30 m shaded relief. The feature is represented by multiple polygons and is considered a Landtype in the ECOMAP hierarchy (see section 3). The polygons and arcs are attributed in the same way as the respective features in the dune fields and playas coverage.

Coverage name: badlands

Coverage size: 83 Kbytes

Date of last revision: 1 Feb 96

7.2. Arc/Info Descriptions

7.2.1. Dune Fields and Playas Coverage

```
              Description of SINGLE precision coverage dunes-playas

                               FEATURE CLASSES

                                        Number of  Attribute     Spatial
Feature Class            Subclass       Features   data (bytes)  Index?   Topology?
-------------            --------       ---------  ------------  -------  ---------
ARCS                                          369       136
POLYGONS                                      299        20                  Yes
NODES                                         326
ANNOTATIONS               (blank)               0

                              SECONDARY FEATURES

Tics                                           63
Arc Segments                                 9858
Polygon Labels                                298

                                  TOLERANCES

Fuzzy    =                  1.000 V          Dangle  =                    0.000 V

                              COVERAGE BOUNDARY

Xmin =                  53483.941            Xmax =                  328922.125
Ymin =                4551879.500            Ymax =                 4702930.000

                                    STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

                         COORDINATE SYSTEM DESCRIPTION

Projection                     UTM
Zone                            13
Units                       METERS              Spheroid      CLARKE1866
Parameters:
```

7.2.2. Badlands Coverage

```
                Description of SINGLE precision coverage badlands

                               FEATURE CLASSES

                                        Number of  Attribute     Spatial
Feature Class            Subclass       Features   data (bytes)  Index?   Topology?
-------------            --------       ---------  ------------  -------  ---------
ARCS                                           51       136
POLYGONS                                       22        20                  Yes
NODES                                          51

                              SECONDARY FEATURES

Tics                                            8
Arc Segments                                 7517
Polygon Labels                                 21
```

```
                                TOLERANCES

Fuzzy    =                   1.000 V          Dangle  =                0.000 V

                             COVERAGE BOUNDARY

Xmin =                    48863.953           Xmax =                268754.489
Ymin =                  4543084.000           Ymax =               4708395.000

                                  STATUS

The coverage has not been Edited since the last BUILD or CLEAN.

                      COORDINATE SYSTEM DESCRIPTION

Projection                      UTM
Zone                             13
Units                        METERS            Spheroid       CLARKE1866
Parameters:
```

7.3. Polygon Attributes

7.3.1. Items

```
COLUMN   ITEM NAME          WIDTH OUTPUT  TYPE N.DEC  ALTERNATE NAME     INDEXED?
     1   AREA                   4     18     F     3                          -
     5   PERIMETER              4     12     F     3                          -
     9   <COVER>#               4      5     B     -                          -
    13   <COVER>-ID             4      5     B     -                          -
    17   LTCODE                 3      3     I     -                          -
```

Note: The items for the badlands coverage are the same as the items for the dune fields and playas coverage and the variable <COVER> represents DUNES-PLAYAS or BADLANDS, depending on the coverage.

7.3.2. Item Definitions

<COVER>-ID This field contains the user-assigned polygon ID number. Each polygon in both coverages has a unique number assigned by setting the user ID equal to the internal Arc/Info ID number minus one.

LTCODE This field contains a three digit code to indicate the Landtype.

Code	Landtype
101	Dune Sand and Loess
102	Playa Lake and Other Lacustrine Deposits
103	Badlands
999	Unclassified

7.4. Line Attributes

7.4.1. Items

```
COLUMN   ITEM NAME         WIDTH OUTPUT  TYPE N.DEC  ALTERNATE NAME      INDEXED?
     1  FNODE#                 4      5     B     -                          -
     5  TNODE#                 4      5     B     -                          -
     9  LPOLY#                 4      5     B     -                          -
    13  RPOLY#                 4      5     B     -                          -
    17  LENGTH                 4     12     F     3                          -
    21  <COVER>#               4      5     B     -                          -
    25  <COVER>-ID             4      5     B     -                          -
    29  TYPE                   4      5     I     -                          -
    33  SOURCE                 4      5     I     -                          -
    37  NOTE                 100    100     C     -                          -
```

Note: The items for the badlands coverage are the same as the items for the dune fields and playas coverage and the variable <COVER> represents DUNES-PLAYAS or BADLANDS, depending on the coverage.

7.4.2. Item Definitions

<COVER>-ID	This field contains the user-assigned polygon ID number. Each arc in both coverages has a unique four digit number assigned by setting the user ID equal to the internal Arc/Info ID number plus 1000.
TYPE	This field contains a one digit code that indicates the line type. For the Landtype coverages, TYPE has been set to 7.
SOURCE	This field contains a three digit code that indicates the source GIS layer for the arc or the background display used for on-screen digitizing. The codes are the same as used for the SOURCE field of the arc attributes of the Landtype Association coverage and are defined in Section 6.4.2.
NOTE	This field contains comments concerning the source of the arc or the criteria used when digitizing the arc.

7.5. Map Accuracy

The discussion of map accuracy in section 6.5 also applies to both of the Landtype coverages.

8. CONTRACT PRODUCTS

The following deliverables were specified in the work order (see section 1).

a) 25 copies of a written report with rationale for the delineations,
b) a preliminary map product within 5 months of the initiation of the agreement,
c) 3 sets of slides of the maps,
d) 3 sets of overlays for the overhead projector,
e) 3 small paper maps and 3 large paper maps will be produced. Scale and content to be determined by the BLM.

During the course of the contract, a mutual agreement was reached that only five original hard copies of the report needed to be provided. The BLM State Office would then reproduce as many as wanted in house.

A preliminary map product was available within five months but was not reviewed by BLM personnel.

The slides, overlays and paper maps have been supplied as specified.

In addition, 239 slides taken during the aerial photographic reconnaissance of the map area have been provided, along with notes describing the views of each slide.

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10. FIGURES

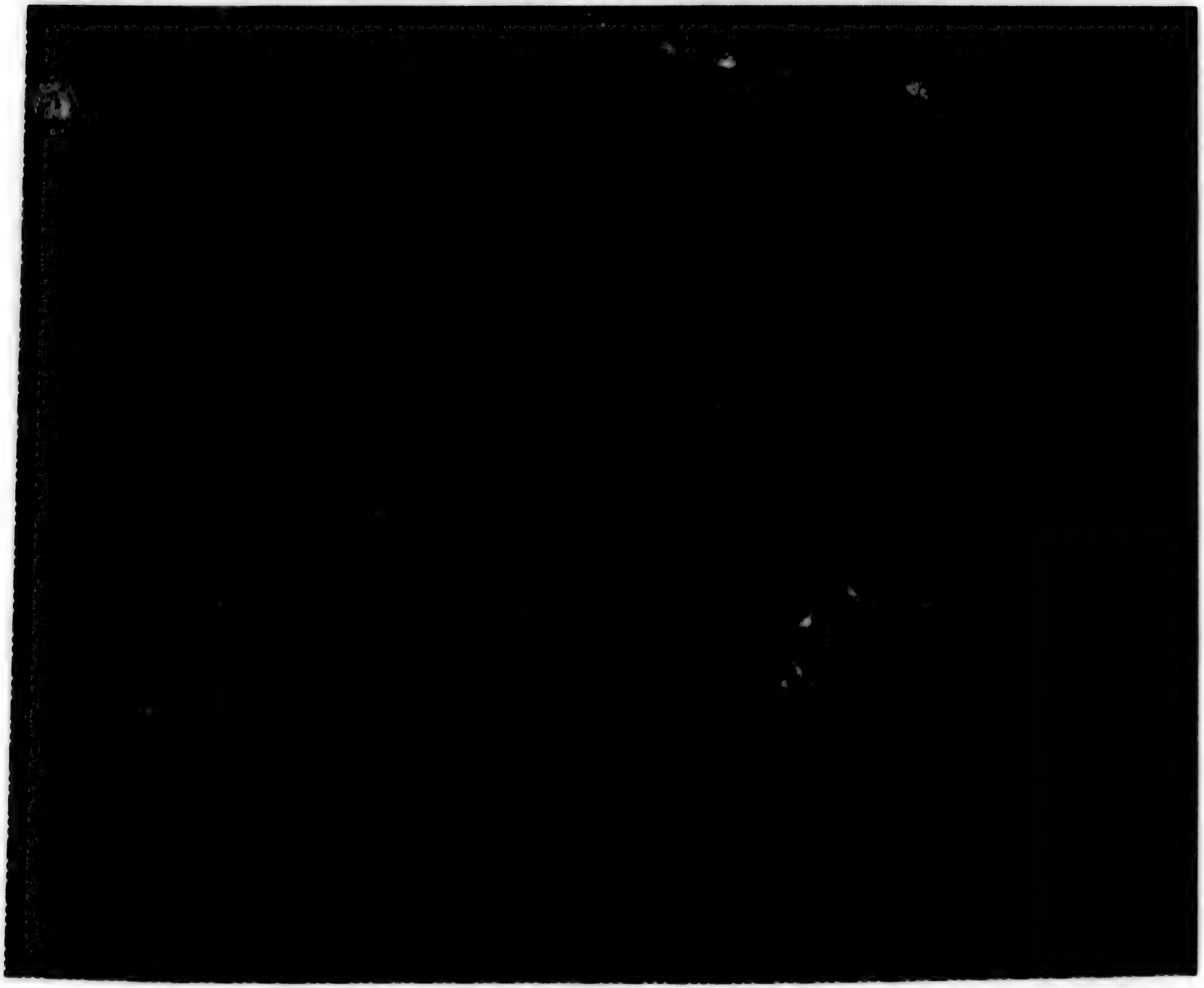


Figure 1. Mosaic of thematic mapper data for southwest Wyoming with bands 4, 5 and 3 rendered in red, green and blue, respectively.

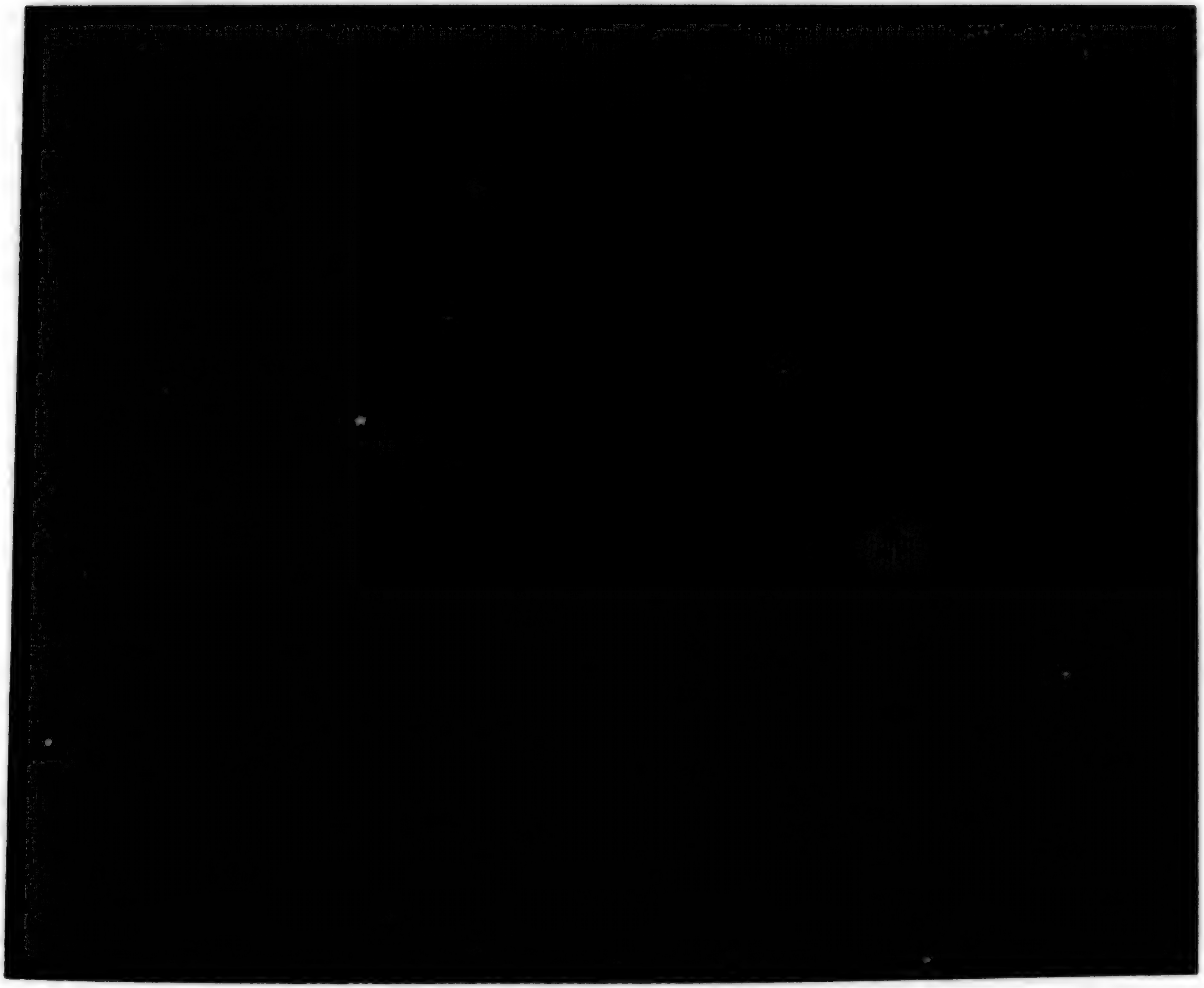


Figure 2. Geology of southwest Wyoming derived from Love and Christiansen (1985). The legend for the map is not shown due to the number of geologic units and the map scale. For unit identification see Love and Christiansen (1995).

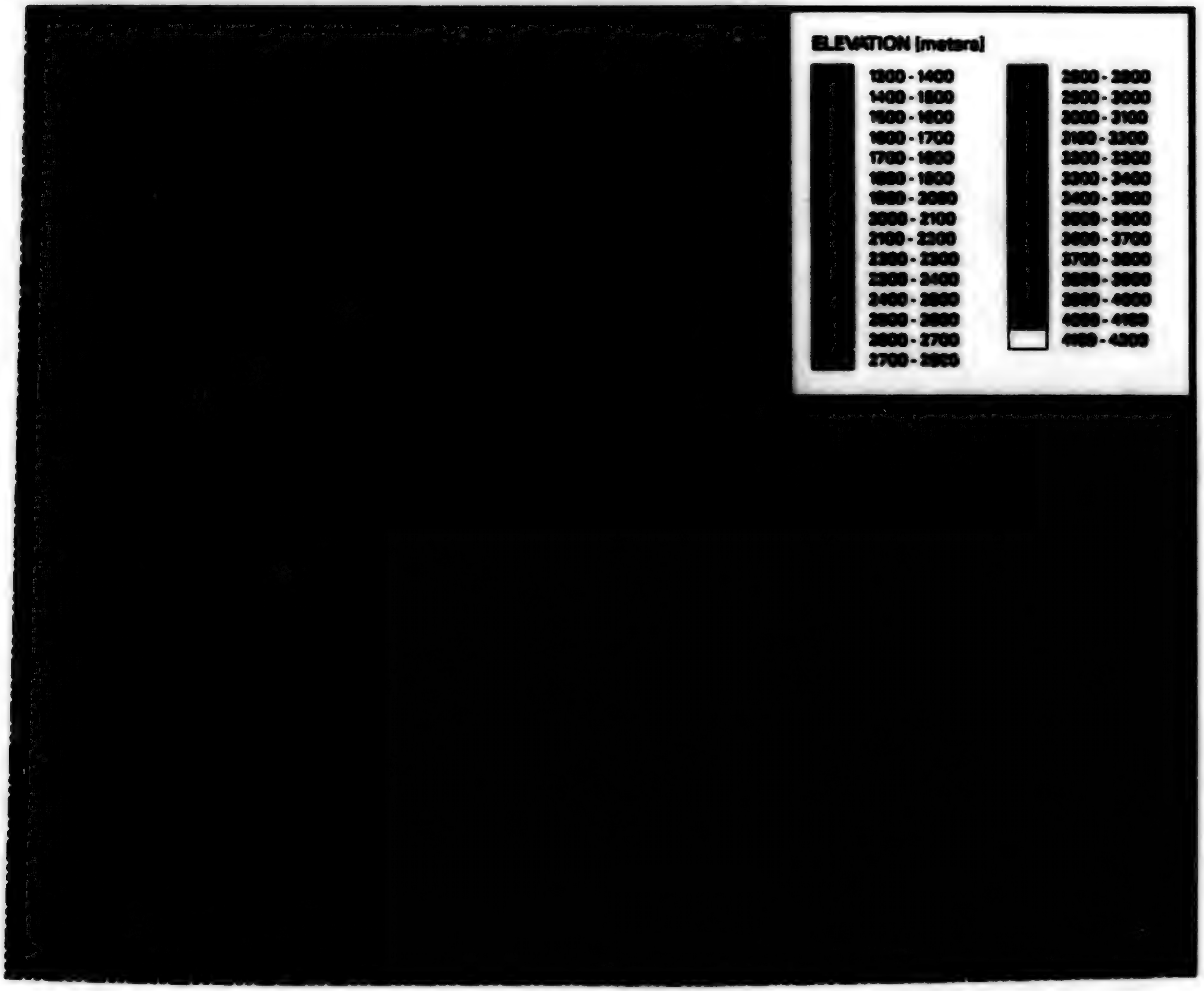


Figure 3. Elevations for southwest Wyoming as they occur in 100 m intervals derived from 90 m DEM data.

Figure 4. Slope of southwest Wyoming derived frim 90 m DEM data. Brighter areas indicated steeper slopes.

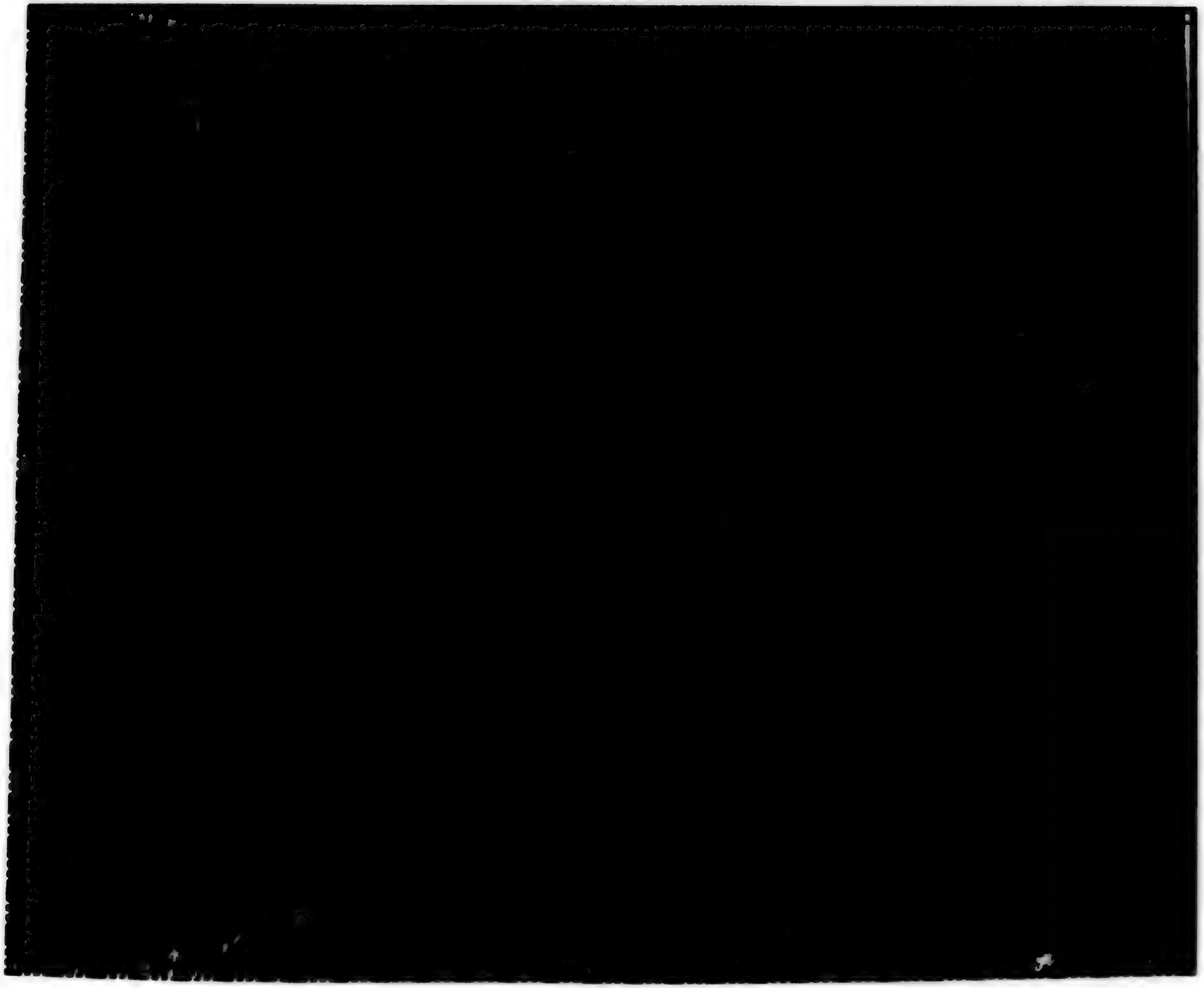


Figure 5. Shaded relief of southwest Wyoming derived from 90 m DEM data.

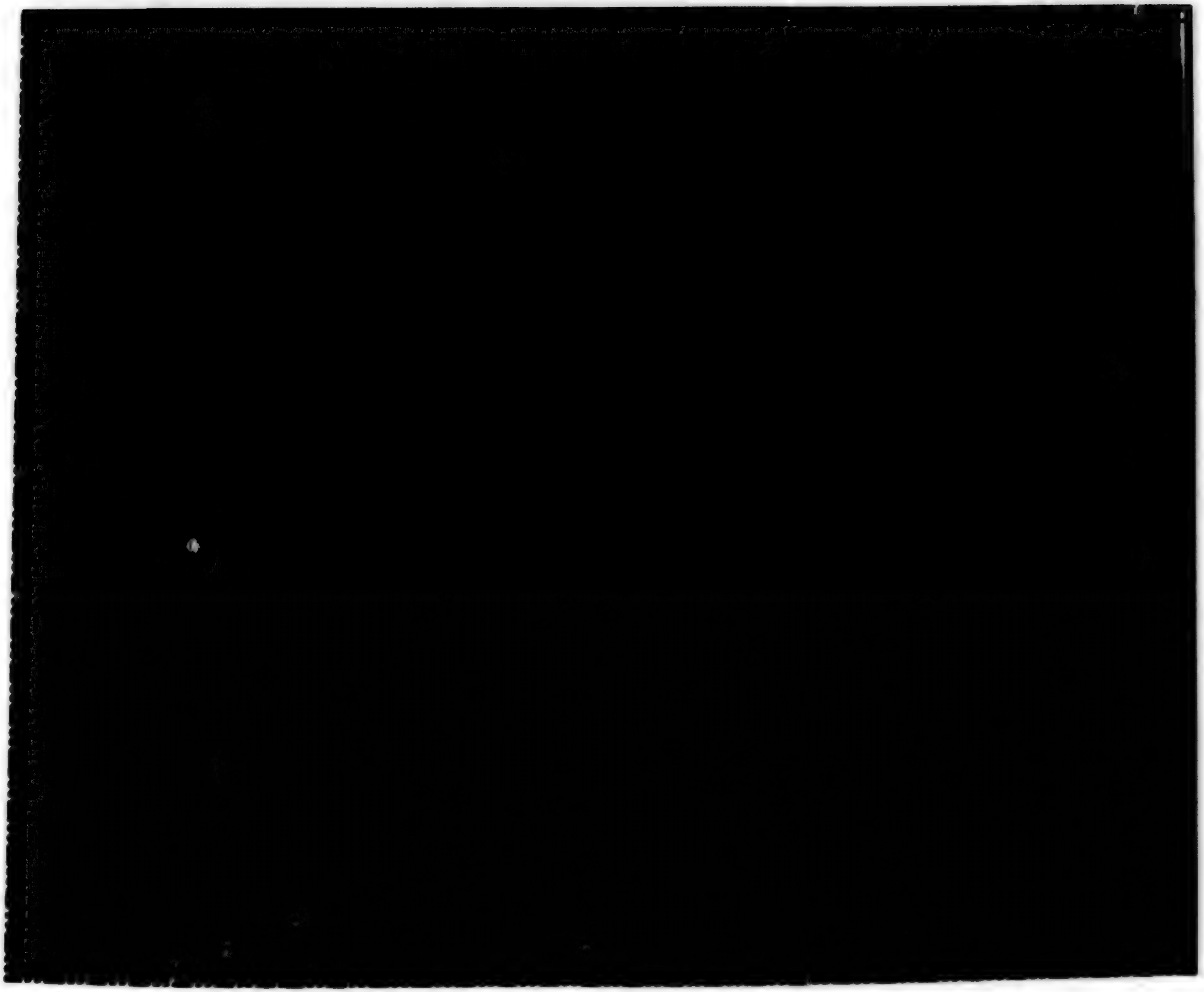


Figure 6. Mean annual precipitation isolines for southwest Wyoming shown over shaded relief. The isoline interval is 100 mm, with supplementary isolines (dashed lines) at 50 mm intervals. Precipitation values in millimeters are shown for the index isolines.

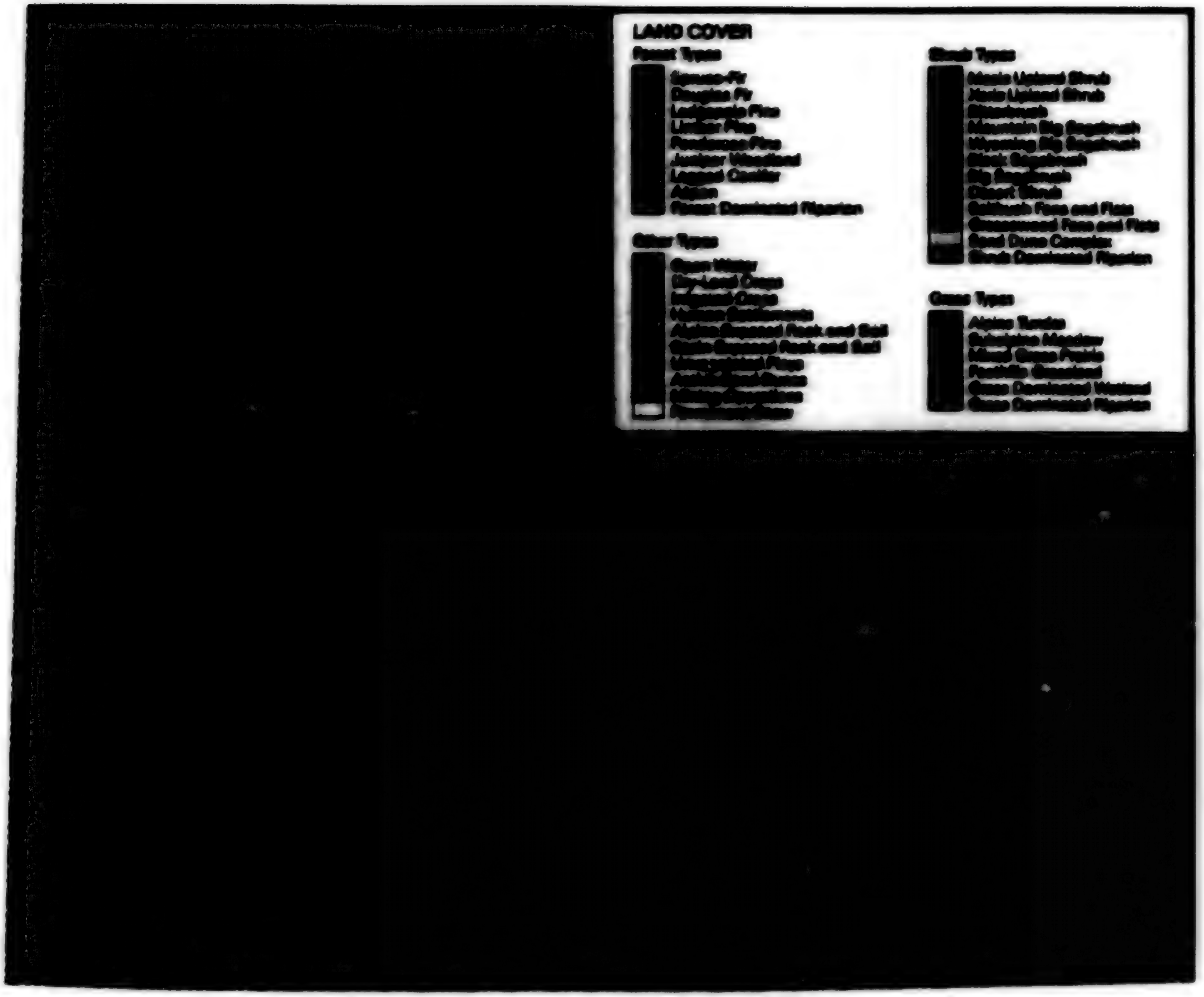


Figure 7. Land cover of southwest Wyoming derived from Wyoming GAP land cover map.

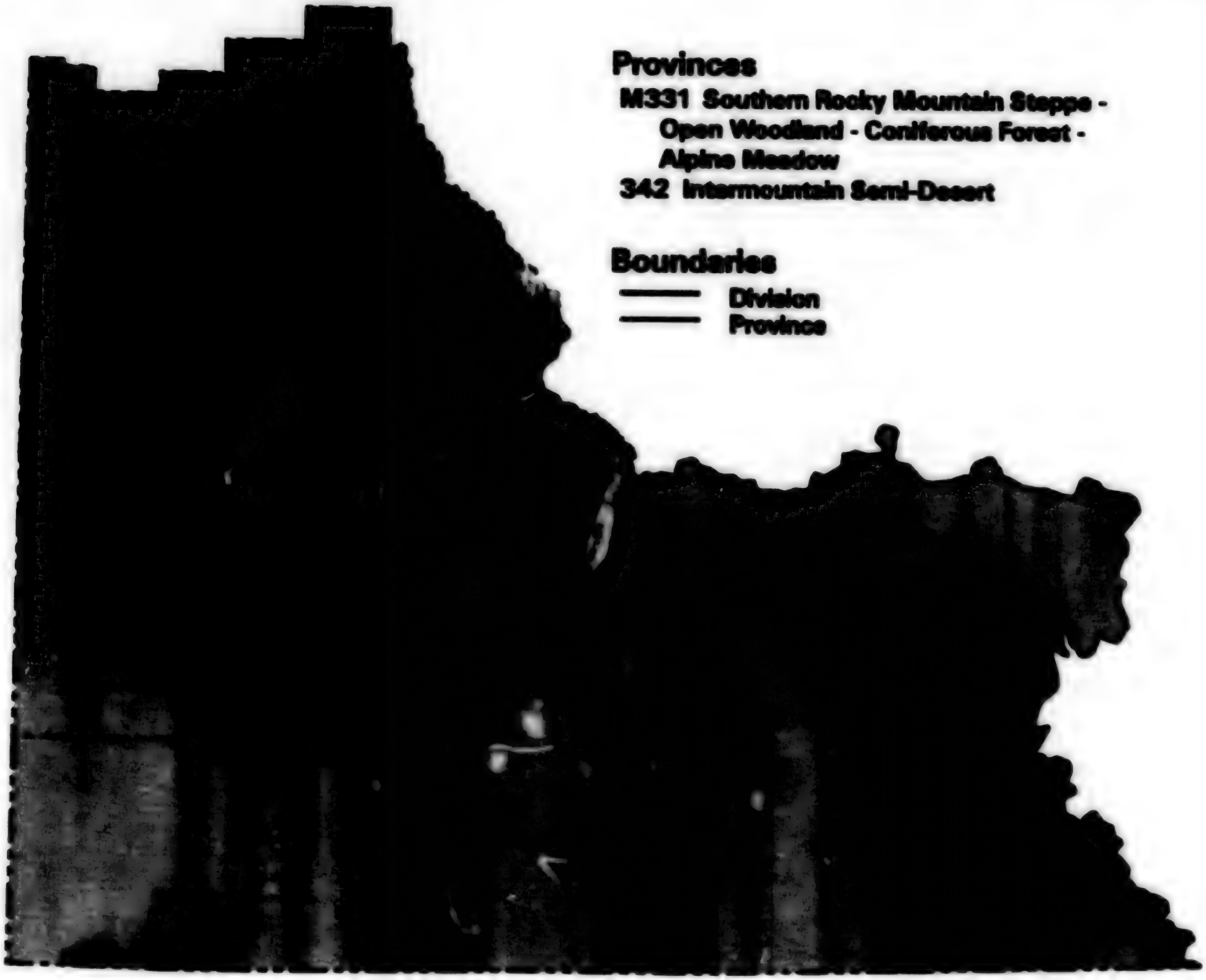

Provinces
M331 Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow
342 Intermountain Semi-Desert
Boundaries
Division
Province

Figure 8. Provinces of southwest Wyoming as delineated by Reiners and Thurston.

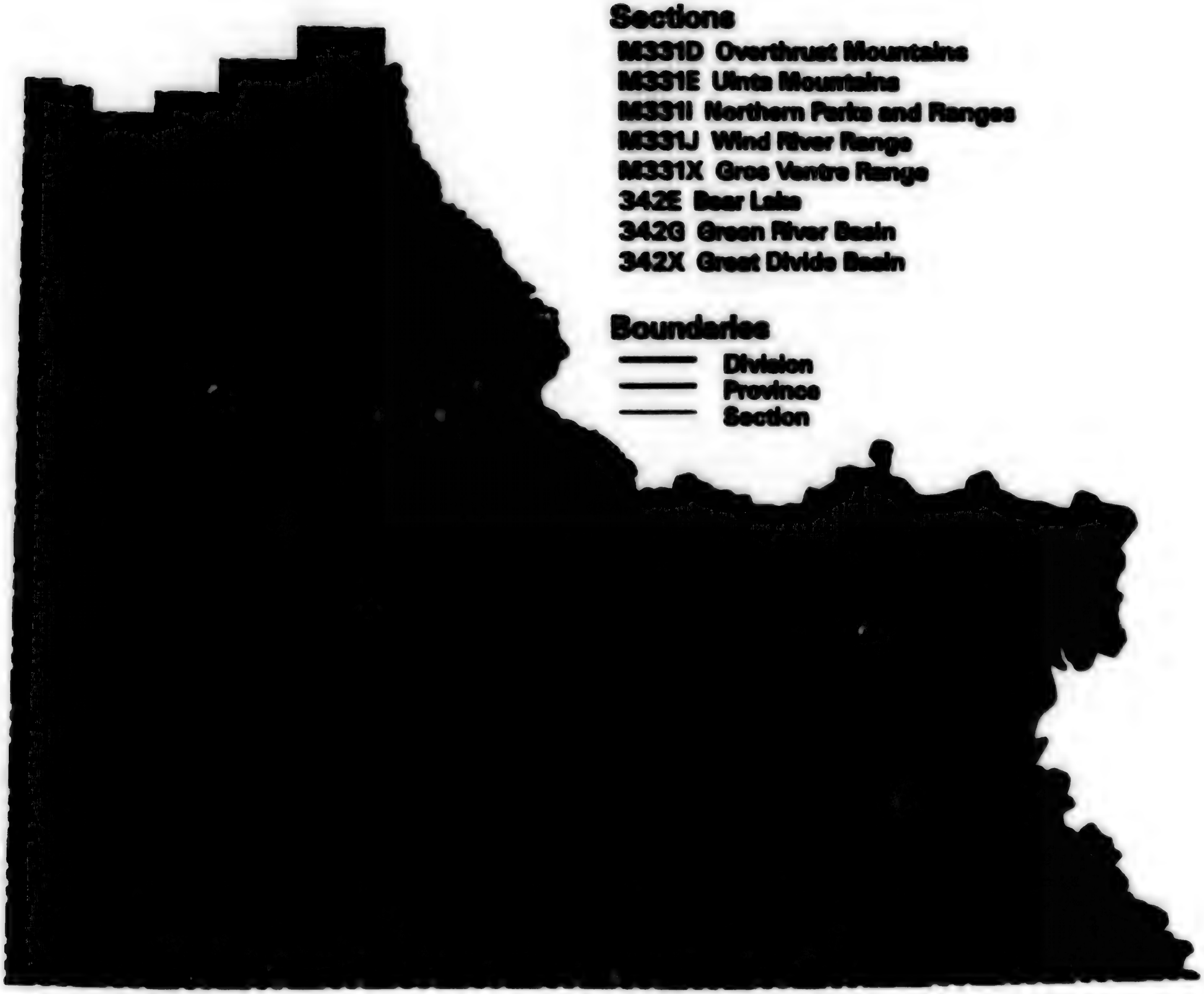


Figure 9. Sections of southwest Wyoming as delineated by Reiners and Thurston.

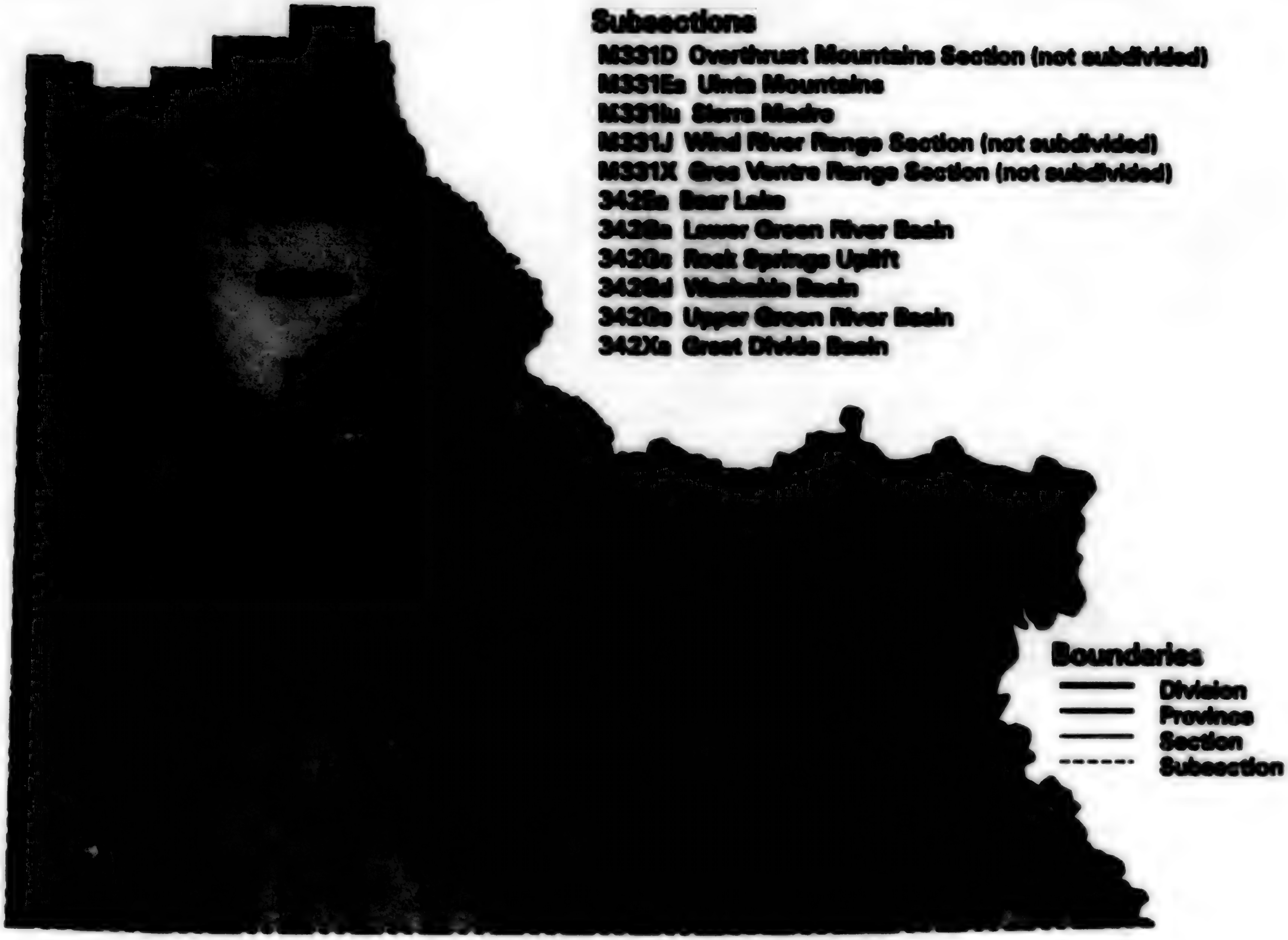

Subsections
M331D Overthrust Mountains Section (not subdivided)
M331Ea Uinta Mountains
M331Iu Sierra Madre
M331J Wind River Range Section (not subdivided)
M331X Gros Ventre Range Section (not subdivided)
342Ea Bear Lake
342Ga Lower Green River Basin
342Gc Rock Springs Uplift
342Gd Washakie Basin
342Ge Upper Green River Basin
342Xa Great Divide Basin
Boundaries
Division
Province
Section
Subsection

Figure 10. Subsections of southwest Wyoming as delineated by Reiners and Thurston.

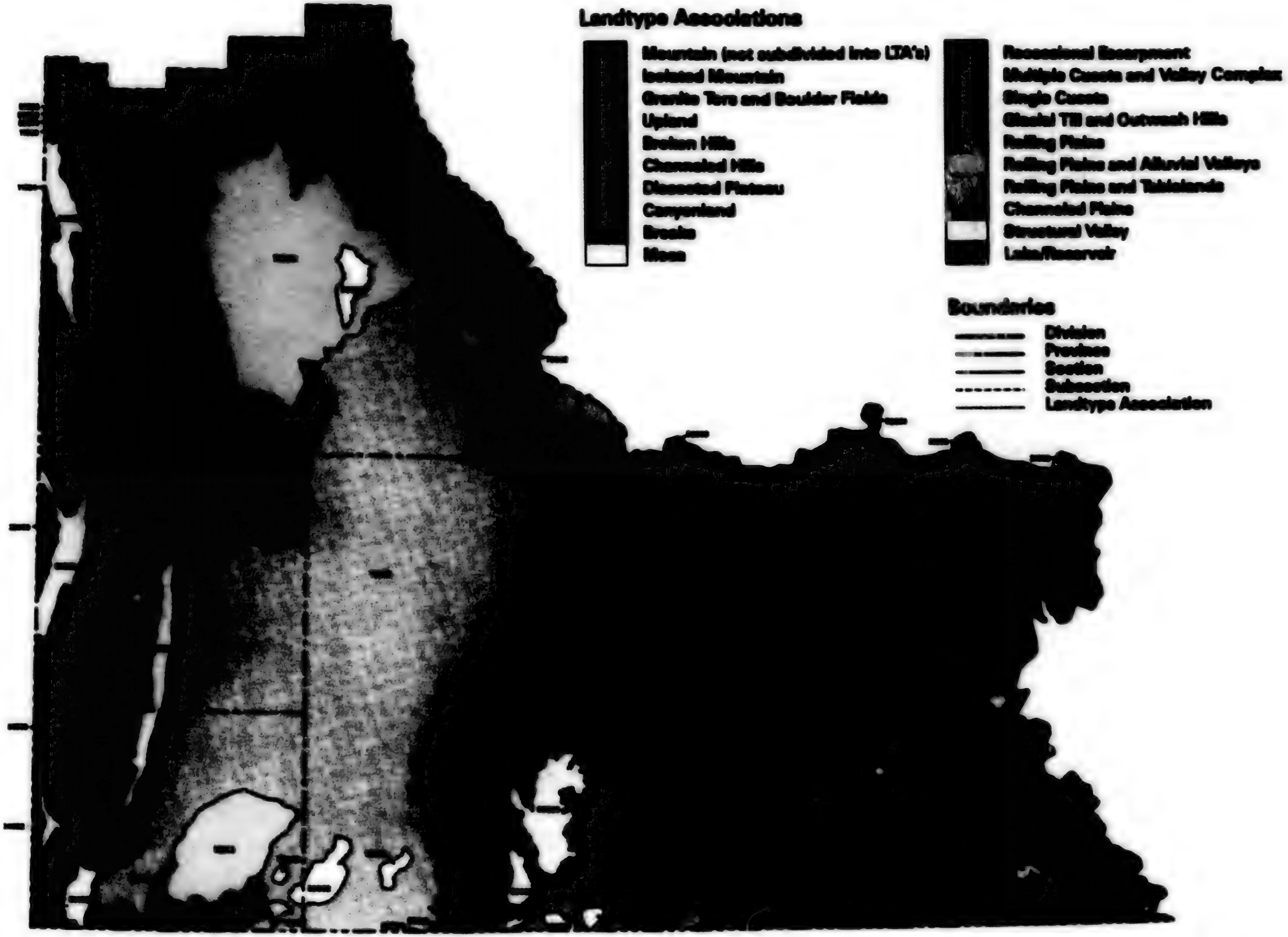


Figure 11. Landtype Associations of southwest Wyoming as delineated by Reiners and Thurston. The user assigned polygon ID numbers for the Landtype Association coverage are shown for each polygon.

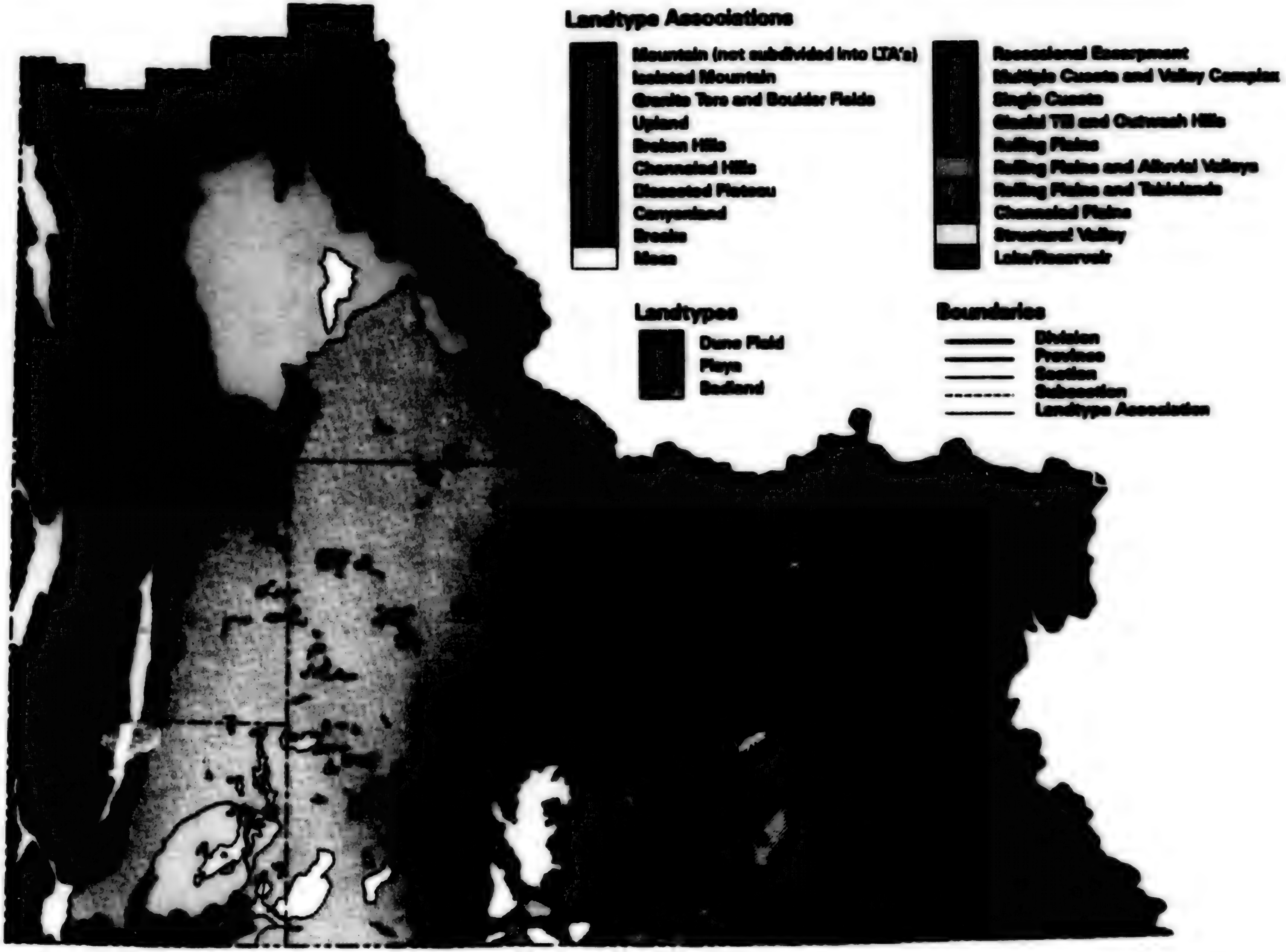


Figure 12. Dune field, playa and badland Landtypes fo southwest Wyoming as delineated by Reiners and Thurston and displayed over Landtype Associations.

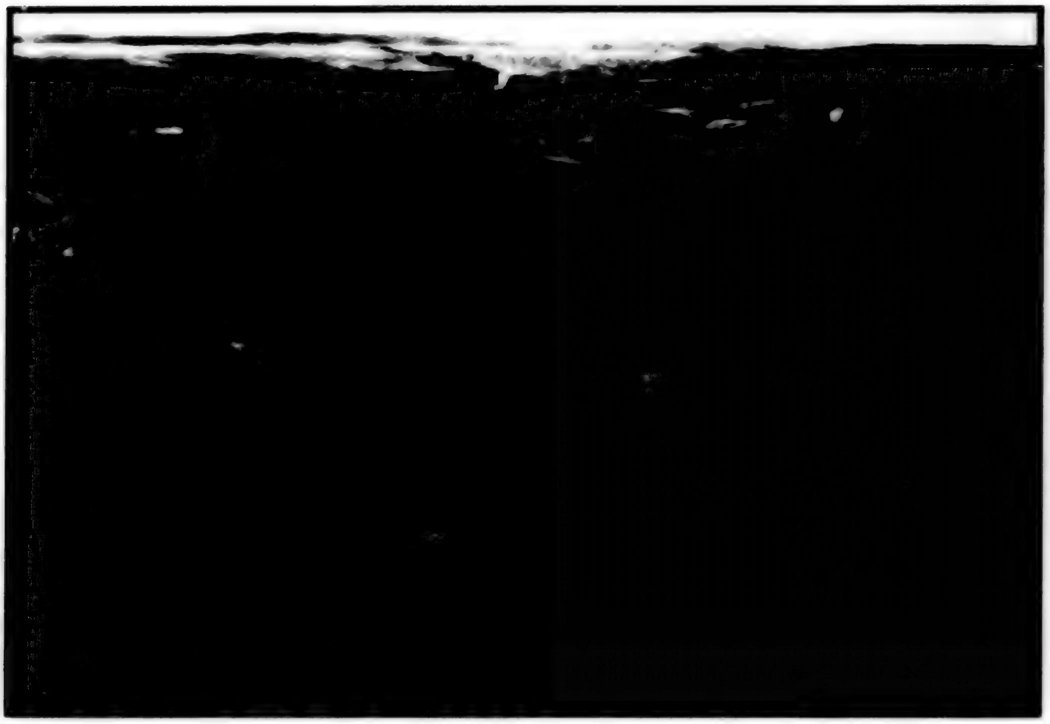


Figure 13. Aerial view of Miocene Sandstone Dissected Plateau.

Figure 14. Aerial view of Cedar Mountain Mesa.

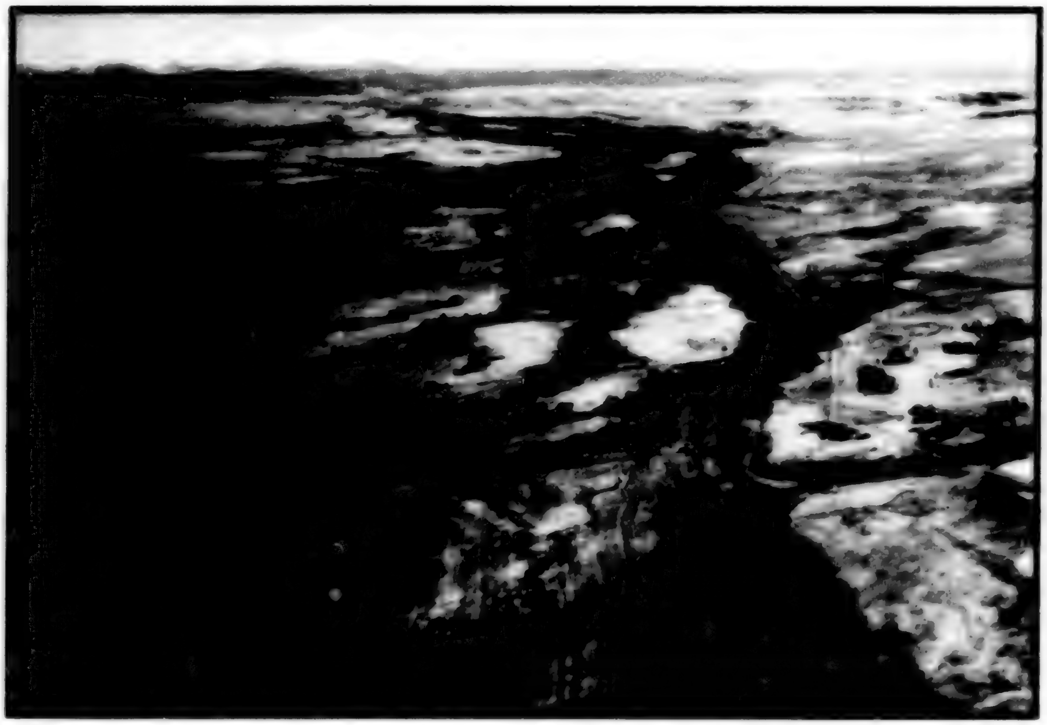


Figure 15. Aerial view of Blacks Fork Rolling Plains and Alluvial Valleys.

Figure 16. Aerial view of badlands off the southeastern corner of The Haystacks, Washakie Basin.

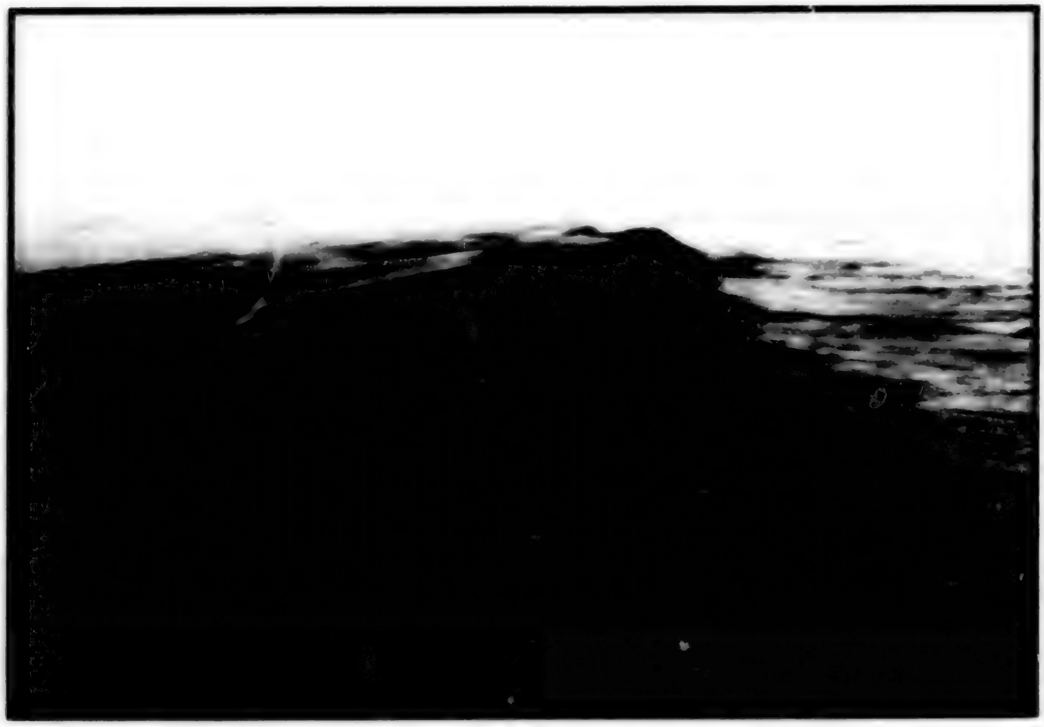


Figure 17. Aerial view of Kinney Rim, a single cuesta on the southwestern boundary of the Washakie Basin.

Figure 18. Aerial view of multiple cuesta and valley complex around the Rawlins Uplift in the Great Divide Basin Section.

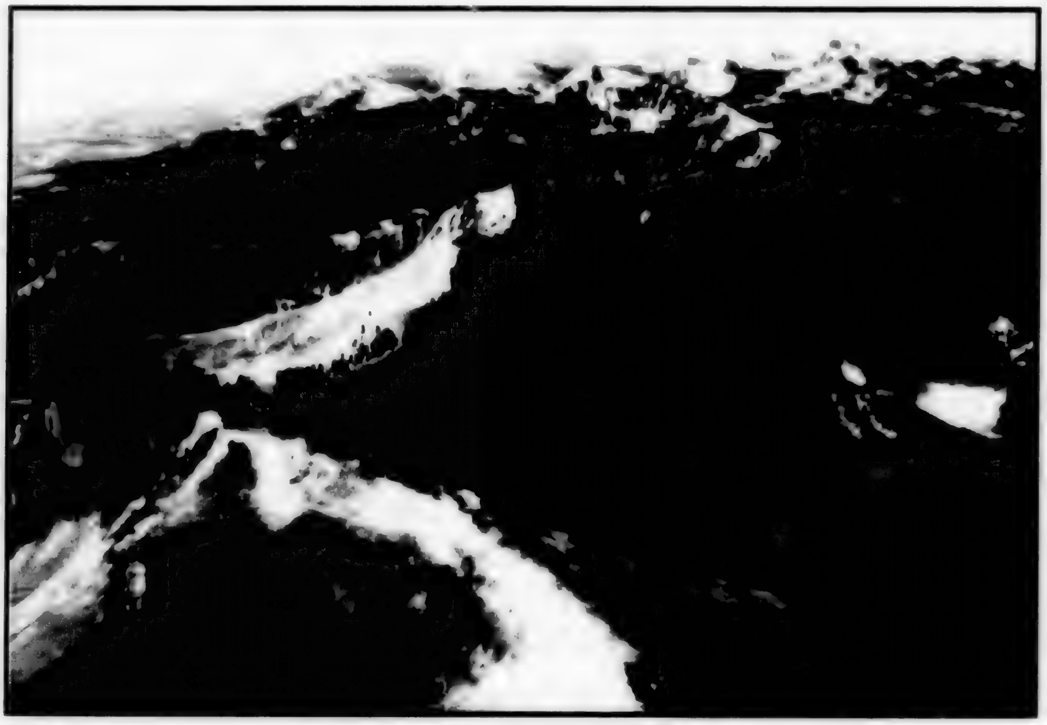


Figure 19. Aerial view south down the Salt River Range.

Figure 20. Aerial view of badlands Landtype south of The Haystacks, Washakie Basin.

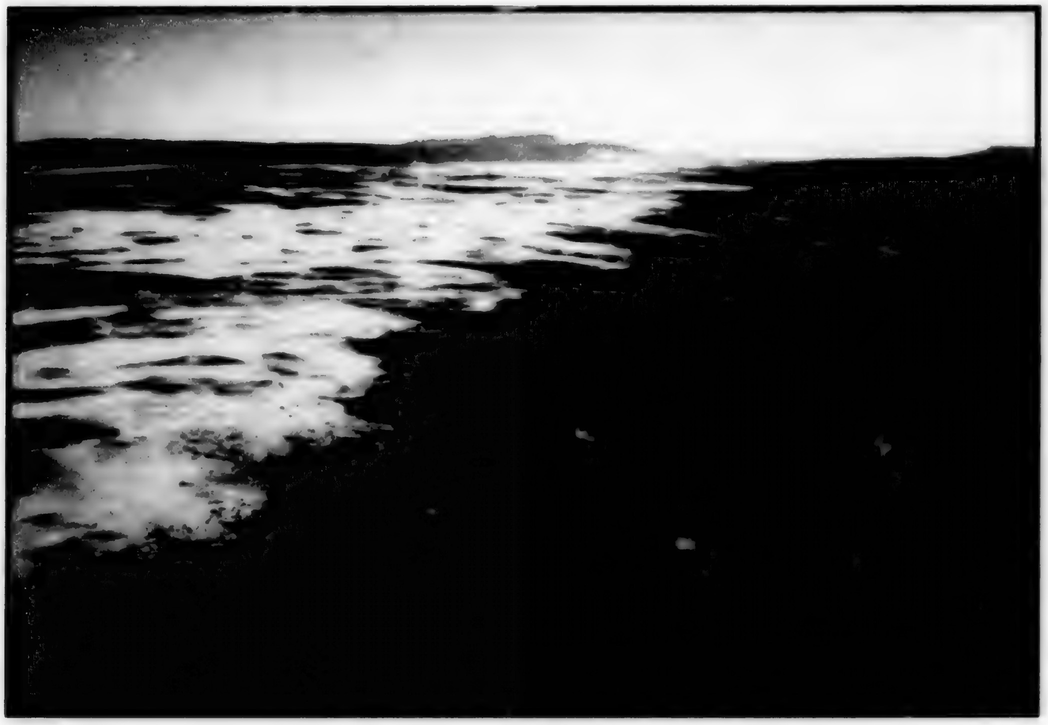
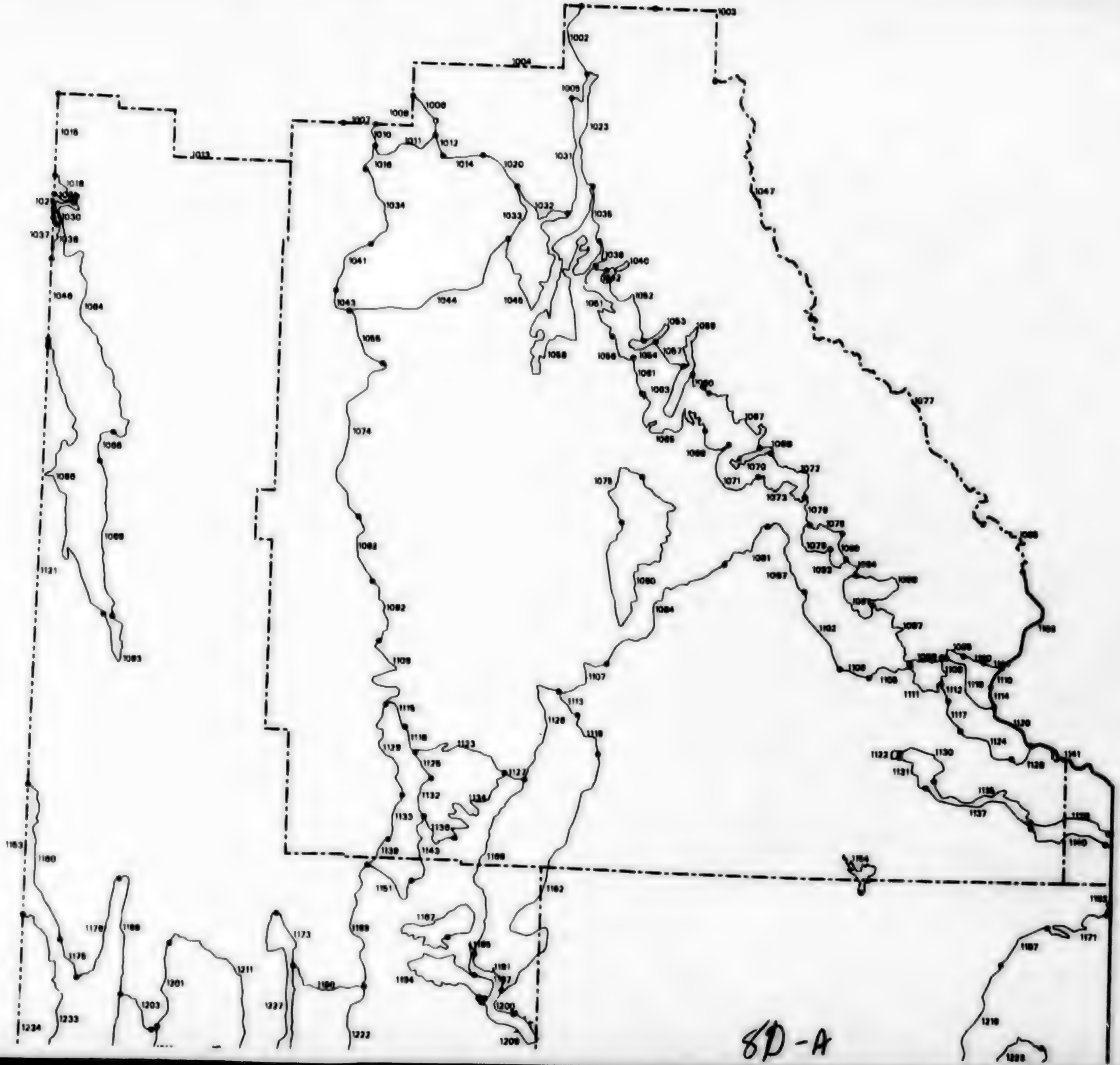


Figure 21. Aerial view of Killpecker dune fields west of Steamboat Mountains.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8D-A

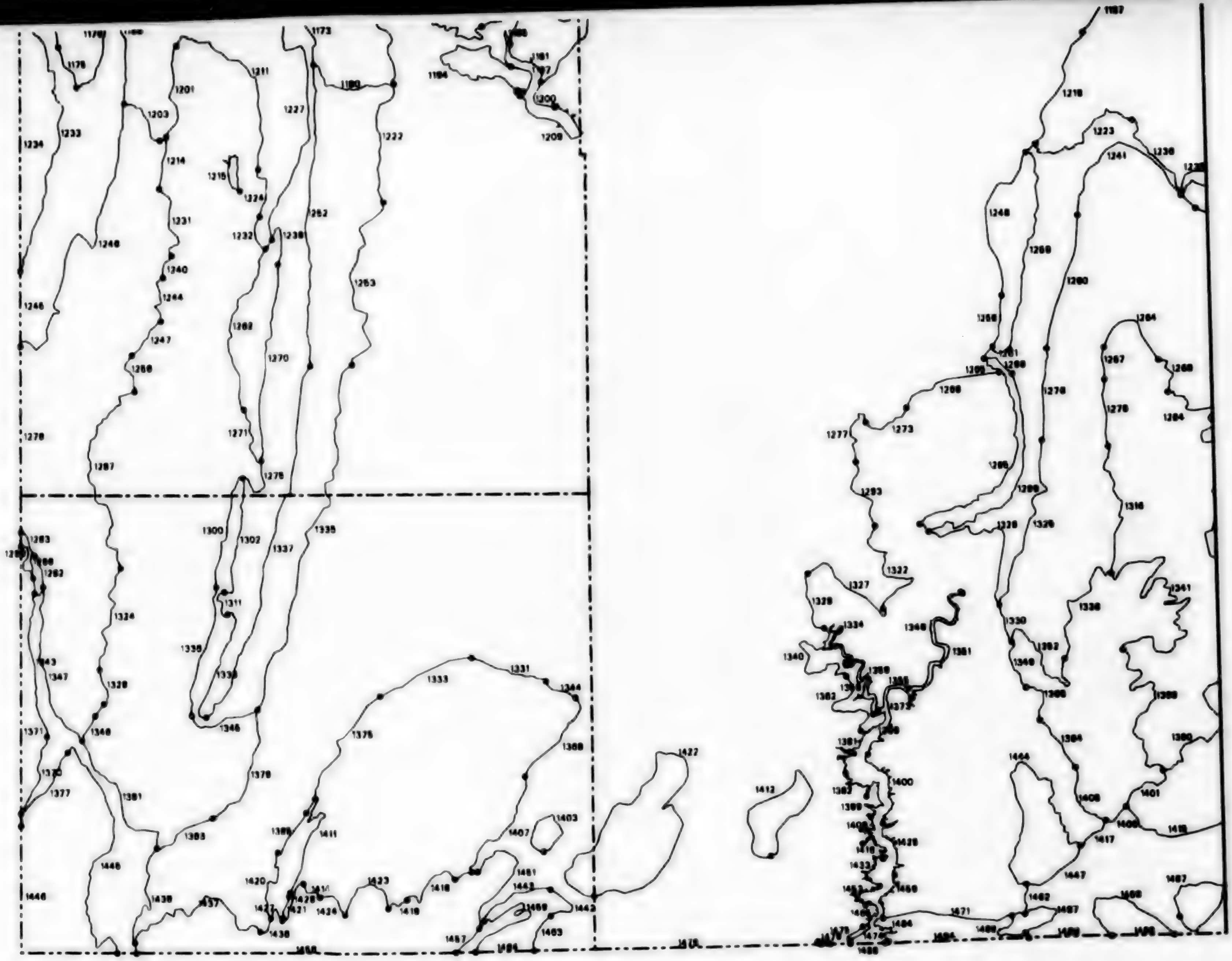

Fig. 22 Arcs of the Landtype Association coverage in the west part of the southwest Wyoming area with the user-assigned arc identification numbers shown for arcs longer than 3000 m.

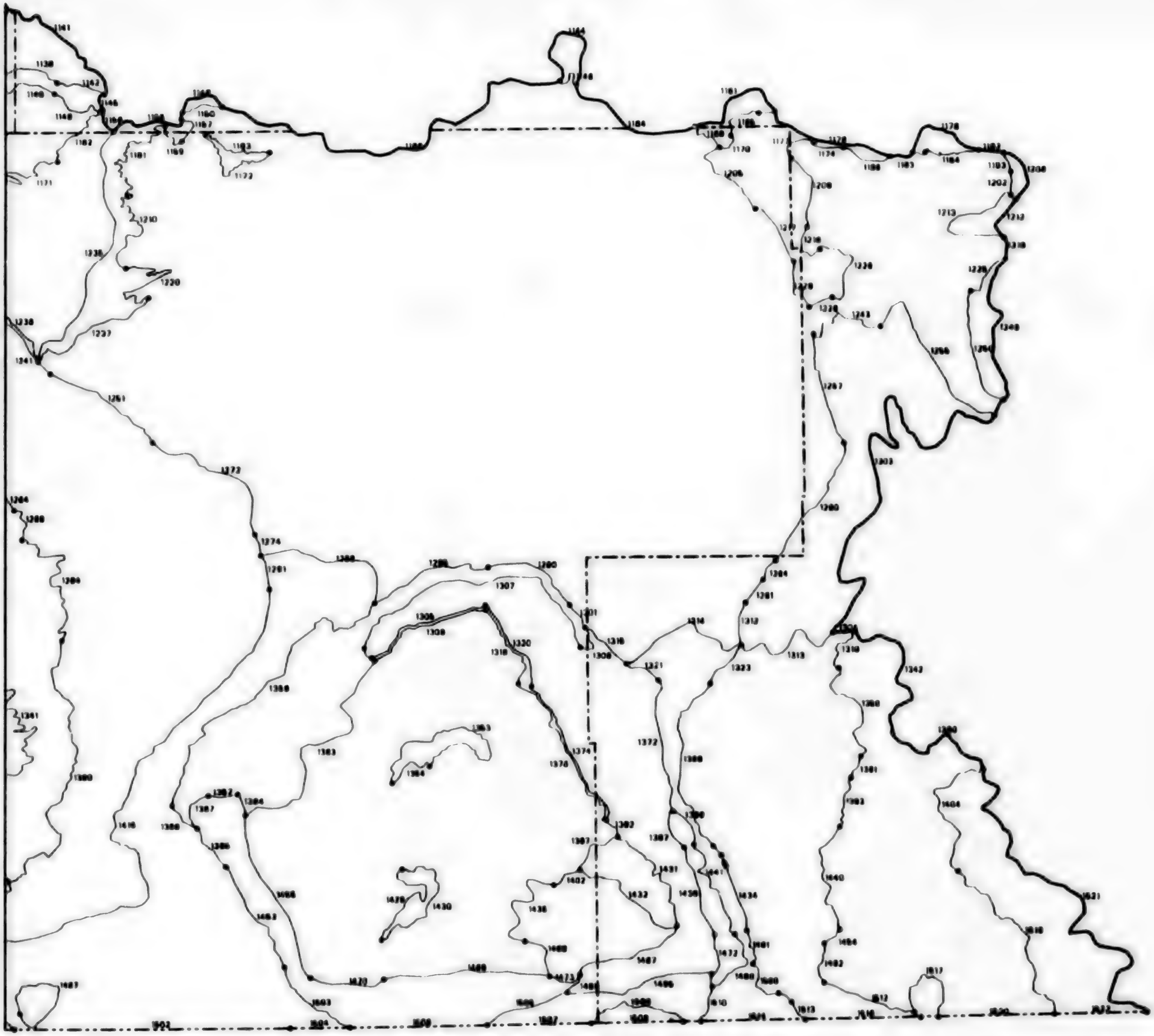

Fig. 23 Årcs of the Landtype Association coverage in the east part of the southwest Wyoming area with the user-assigned arc identification numbers shown for arcs longer than 3000 m.

11. APPENDIX: TABULAR DATA FOR MAP FEATURES

Table 1. Land units for southwest Wyoming organized according to the ECOMAP hierarchy. The ECOMAP code, also referred to as the land unit code, and the descriptive name are given for each unit. The five digit numbers following the land unit codes at the Landtype Association level are the polygon identification numbers for the individual polygons of the Landtype Association coverage shown in Figure 11. . . . . A-3

Table 2. Land unit codes and names for the polygons of the Landtype Association coverage. The polygon ID is Arc/Info polygon identification number assigned by the user when the coverage was created. A-7

Table 3. Areas of delineated land units in southwest Wyoming. Names of the land units associated with the land unit codes are presented in Table 1 of the appendix. The polygon ID is the identification number assigned to a polygon of the Landtype Association coverage. When a Landtype Association (LTA) consists of more than one polygon, the polygons are listed separately. A-9

Table 4. Elevation data for delineated land units in southwest Wyoming. See the methods sections for information on how the statistics were calculated using 90 m DEM data. Names of the land units associated with the land unit codes are presented in Table 1 of the Appendix. The polygon ID is the identification number assigned to a polygon of the Landtype Association coverage. When a Landtype Association (LTA) consists of more than one polygon, the polygons are listed separately. A-12

Table 5. Annual precipitation data for delineated land units in southwest Wyoming. See the methods sections for information on how the statistics were calculated Names of the land units associated with the land unit codes are presented in Table 1 of the Appendix. The polygon ID is the identification number assigned to a polygon of the land unit coverage. When a Landtype Association (LTA) consists of more than one polygon, the polygons are listed separately. A-15

Table 6. Land cover data for delineated land units of southwest Wyoming. The data were calculated for individual polygons of the Landtype Association coverage, which are identified by the polygon ID number followed by the corresponding land unit code (LUCode). Names associated with the land unit codes are presented in Table 1 of this Appendix, while the land cover codes are defined in Table 7 of this Appendix. Land cover types with areas less than 500 ha have been removed from the table in most cases. See the methods section for information on how the data were calculated. A-18

Table 7. Description of the land cover types of southwest Wyoming. A-24

Table 8. Geology data for delineated land units of southwest Wyoming. The data were calculated for individual polygons of the Landtype Association coverage, which are identified by the polygon ID number followed by the corresponding land unit code (LUCode). Names associated with the land unit codes are presented in Table 1 of this Appendix, while the geology codes are defined in Table 9 of this Appendix. Geologic units with areas less than 100 ha have been eliminated from the table in most cases. See the methods section for information on how the data were calculated. . . . A-30

Table 9. Explanation of codes for the geologic units of southwest Wyoming. . . . A-37

Table 10. A list of the arc attributes for each arc in the Landtype Association coverage. A-40

Table 1. Land units for southwest Wyoming organized according to the ECOMAP hierarchy. The ECOMAP code, also referred to as the land unit code, and the descriptive name are given for each unit. The five digit numbers following the land unit codes at the Landtype Association level are the polygon identification numbers for the individual polygons of the Landtype Association coverage shown in Figure 11.

300 Dry Domain

340 Temperate Desert Division

342 Intermountain Semi-Desert Province

342E Bear Lake Section

342Ea Bear Lake Subsection

Landtype Associations

342Ea24	24001	Overthrust Belt Broken Hills
	24002	Overthrust Belt Broken Hills
342Ea25	25001	Overthrust Belt Channeled Hills
	25002	Overthrust Belt Channeled Hills
	25003	Overthrust Belt Channeled Hills
342Ea51	51006	Overthrust Belt Multiple Cuesta and Valley Complex
	51007	Overthrust Belt Multiple Cuesta and Valley Complex
342Ea81	81001	Bear River Valley (Structural Valley)
	81002	Bear River Valley (Structural Valley)
	81003	Bear River Valley (Structural Valley)
	81004	Cumberland Flats (Structural Valley)
342Ea83	83007	Naughton Reservoir
	83012	Woodruff Narrows Reservoir

342G Green River Basin Section

342Ga Lower Green River Basin Subsection

Landtype Associations

342Ga21	21001	Battle Mountain (Isolated Mountain)
	21007	The Hogsback-Cretaceous Mountain (Isolated Mountain)
342Ga22	22001	Prospect Mountains Granite Tors and Boulder Fields
342Ga23	23002	Steamboat Mountain-Oregon Buttes Upland
342Ga33	33001	Miocene Sandstone Dissected Plateau
342Ga34	34001	Flaming Gorge Canyonlands
342Ga35	35001	Green River Breaks
	35002	Green River Breaks
	35003	Green River Breaks
	35004	Green River Breaks
342Ga36	36001	Black Mountain-Twin Buttes Mesa
	36002	Cedar Mountain Mesa
	36003	Little Mountain Mesa
	36004	Pine Mountain Mesa
	36006	Richards Mountains Mesa
	36007	Sage Creek Mountain Mesa
	36008	Tepee Mountains Mesa

Table 1 continued

342Ga41	41004	White Mountain Recessional Escarpment
342Ga51	51004	Muddy Creek Multiple Cuesta and Valley Complex
	51011	The Glades Multiple Cuesta and Valley Complex
	51012	The Glades Multiple Cuesta and Valley Complex
342Ga52	52004	White Mountain Single Cuesta
	52005	Wind River Fault Line Cuestas
342Ga61	61003	Uinta Mountains Glacial Till and Outwash Hills
	61004	Uinta Mountains Glacial Till and Outwash Hills
	61008	Wind River Range Glacial Till and Outwash Hills
342Ga71	71004	Killpecker Creek Rolling Plains
	71005	Little Snake River Rolling Plains
	71006	Muddy Creek Rolling Plains
	71008	Vermillion Creek-Alkali Creek Rolling Plains
342Ga72	72001	Blacks Fork Rolling Plains and Alluvial Valleys
	72002	Henrys Fork Rolling Plains and Alluvial Valleys
342Ga73	73001	Lower Green River Basin Rolling Plains and Tablelands
	73002	Lower Green River Basin Rolling Plains and Tablelands
342Ga83	83001	Big Sandy Reservoir
	83003	Flaming Gorge Reservoir
	83004	Flaming Gorge Reservoir
	83005	Fontenelle Reservoir

342Gc Rock Springs Uplift Subsection

Landtype Associations

342Gc36	36005	Quaking Aspen Mountain-Miller Mountain Mesa
342Gc51	51009	Rock Springs Uplift Multiple Cuesta and Valley Complex
342Gc71	71007	Rock Springs Uplift Interior Basin

342Gd Washakie Basin Subsection

Landtype Associations

342Gd21	21003	Flat Top Mountain (Isolated Mountain)
	21005	The Haystacks (Isolated Mountain)
342Gd41	41001	Delaney Rim Recessional Escarpment
	41003	Skull Creek Rim Recessional Escarpment
342Gd51	51002	Cherokee Rim-Red Creek Rim Multiple Cuesta and Valley Complex
	51005	Northwest Washakie Basin Multiple Cuesta and Valley Complex
342Gd52	52002	Kinney Rim-Powder Rim Single Cuesta
	52003	The Bluffs Single Cuesta
342Gd71	71001	Exterior Washakie Basin Rolling Plains
	71003	Interior Washakie Basin Rolling Plains
342Gd75	75001	Sand Creek Channeled Plains

342Ge Upper Green River Basin Subsection

Landtype Associations

342Ge23	23001	Pass Peak Upland
342Ge36	36009	The Mesa

Table 1 continued

342Ge61	61001	Gros Ventre Range Glacial Till and Outwash Hills
	61002	Gros Ventre Range Glacial Till and Outwash Hills
	61005	Wind River Range Glacial Till and Outwash Hills
	61006	Wind River Range Glacial Till and Outwash Hills
	61007	Wind River Range Glacial Till and Outwash Hills
	61009	Wind River Range Glacial Till and Outwash Hills
342Ge72	72003	Upper Green River Basin Rolling Plains and Alluvial Valleys
342Ge83	83002	Boulder Lake
	83006	Fremont Lake
	83008	New Fork Lakes
	83011	Willow Lake

342X Great Divide Basin Section

342Xa Great Divide Basin Subsection

Landtype Associations

342Xa21	21002	Ferris Mountains (Isolated Mountain)
	21004	Seminoe Mountains (Isolated Mountain)
	21006	Whiskey Peak (Isolated Mountain)
342Xa23	23003	Steamboat Mountain-Oregon Buttes Upland
342Xa41	41002	Honeycomb Buttes Recessional Escarpment
342Xa51	51001	Bull Springs Rim Multiple Cuesta and Valley Complex
	51003	Haystack Mountains Multiple Cuesta and Valley Complex
	51008	Rawlins Uplift Multiple Cuesta and Valley Complex
	51010	Table Mountain Multiple Cuesta and Valley Complex
342Xa52	52001	Crooks Mountain Single Cuesta
	52006	Wind River Fault Line Cuestas
342Xa71	71002	Great Divide Basin Rolling Plains

M330 Temperate Steppe Regime Mountains

M331 Southern Rocky Mountain Steppe - Open Woodland-Coniferous Forest - Alpine Meadow Province

M331D Overthrust Mountains Section

M331D- Not subdivided into subsections

Landtype Associations

M331D-11	11002	Overthrust Mountains (Not subdivided into LTA's)
	11003	Overthrust Mountains (Not subdivided into LTA's)
	11004	Overthrust Mountains (Not subdivided into LTA's)
M331D-81	81005	Star Valley (Structural Valley)
	81006	Star Valley (Structural Valley)
M331D-83	83009	Palisades Reservoir
	83010	Palisades Reservoir

Table 1 continued

- M331E Uinta Mountains Section
  - M331Ea Uinta Mountains Subsection
    - M331Ea11 11006 Uinta Mountains (Not subdivided into LTA's)
- M331I Northern Parks and Ranges Section
  - M331Iu Sierra Madre Subsection
    - M331Iu11 11005 Sierra Madre (Not subdivided into LTA's)
- M331J Wind River Range Section
  - M331J- Not subdivided into subsections
    - M331J-11 11007 Wind River Range (Not subdivided into LTA's)
- M331X Gros Ventre Range Section
  - M331X- Not subdivided into subsections
    - M331X-11 11001 Gros Ventre Range (Not subdivided into LTA's)

Table 2. Land unit codes and names for the polygons of the Landtype Association coverage. The polygon ID is Arc/Info polygon identification number assigned by the user when the coverage was created.

Polygon ID	Land Unit Code	Land Unit Name
11001	M331X-11	Gros Ventre Range (Not subdivided into subsections and LTA's)
11002	M331D-11	Overthrust Mountains (Not subdivided into subsections and LTA's)
11003	M331D-11	Overthrust Mountains (Not subdivided into subsections and LTA's)
11004	M331D-11	Overthrust Mountains (Not subdivided into subsections and LTA's)
11005	M331Iu11	Sierra Madre (Not subdivided into LTA's)
11006	M331Ea11	Uinta Mountains (Not subdivided into LTA's)
11007	M331J-11	Wind River Range (Not subdivided into subsections and LTA's)
21001	342Ga21	Battle Mountain (Isolated Mountain)
21002	342Xa21	Ferris Mountains (Isolated Mountain)
21003	342Gd21	Flat Top Mountain (Isolated Mountain)
21004	342Xa21	Seminoe Mountains (Isolated Mountain)
21005	342Gd21	The Haystacks (Isolated Mountain)
21006	342Xa21	Whiskey Peak (Isolated Mountain)
21007	342Ga21	The Hogsback-Cretaceous Mountain (Isolated Mountain)
22001	342Ga22	Prospect Mountains Granite Tors and Boulder Fields
23001	342Ge23	Pass Peak Upland
23002	342Ga23	Steamboat Mountain-Oregon Buttes Upland
23003	342Xa23	Steamboat Mountain-Oregon Buttes Upland
24001	342Ea24	Overthrust Belt Broken Hills
24002	342Ea24	Overthrust Belt Broken Hills
25001	342Ea25	Overthrust Belt Channeled Hills
25002	342Ea25	Overthrust Belt Channeled Hills
25003	342Ea25	Overthrust Belt Channeled Hills
33001	342Ga33	Miocene Sandstone Dissected Plateau
34001	342Ga34	Flaming Gorge Canyonlands
35001	342Ga35	Green River Breaks
35002	342Ga35	Green River Breaks
35003	342Ga35	Green River Breaks
35004	342Ga35	Green River Breaks
36001	342Ga36	Black Mountain-Twin Buttes Mesa
36002	342Ga36	Cedar Mountain Mesa
36003	342Ga36	Little Mountain Mesa
36004	342Ga36	Pine Mountain Mesa
36005	342Gc36	Quaking Aspen Mountain-Miller Mountain Mesa
36006	342Ga36	Richards Mountains Mesa
36007	342Ga36	Sage Creek Mountain Mesa
36008	342Ga36	Tepee Mountains Mesa
36009	342Ge36	The Mesa
41001	342Gd41	Delaney Rim Recessional Escarpment
41002	342Xa41	Honeycomb Buttes Recessional Escarpment
41003	342Gd41	Skull Creek Rim Recessional Escarpment
41004	342Ga41	White Mountain Recessional Escarpment
51001	342Xa51	Bull Springs Rim Multiple Cuesta and Valley Complex
51002	342Gd51	Cherokee Rim-Red Creek Rim Multiple Cuesta and Valley Complex
51003	342Xa51	Haystack Mountains Multiple Cuesta and Valley Complex
51004	342Ga51	Muddy Creek Multiple Cuesta and Valley Complex
51005	342Gd51	Northwest Washakie Basin Multiple Cuesta and Valley Complex
51006	342Ea51	Overthrust Belt Multiple Cuesta and Valley Complex
51007	342Ea51	Overthrust Belt Multiple Cuesta and Valley Complex
51008	342Xa51	Rawlins Uplift Multiple Cuesta and Valley Complex
51009	342Gc51	Rock Springs Uplift Multiple Cuesta and Valley Complex
51010	342Xa51	Table Mountain Multiple Cuesta and Valley Complex
51011	342Ga51	The Glades Multiple Cuesta and Valley Complex
51012	342Ga51	The Glades Multiple Cuesta and Valley Complex
52001	342Xa52	Crooks Mountain Single Cuesta
52002	342Gd52	Kinney Rim-Powder Rim Single Cuesta
52003	342Gd52	The Bluffs Single Cuesta
52004	342Ga52	White Mountain Single Cuesta

Table 2 continued

Polygon ID	Land Unit Code	Land Unit Name
52005	342Ga52	Wind River Fault Line Cuestas
52006	342Xa52	Wind River Fault Line Cuestas
61001	342Ge61	Gros Ventre Range Glacial Till and Outwash Hills
61002	342Ge61	Gros Ventre Range Glacial Till and Outwash Hills
61003	342Ga61	Uinta Mountains Glacial Till and Outwash Hills
61004	342Ga61	Uinta Mountains Glacial Till and Outwash Hills
61005	342Ge61	Wind River Range Glacial Till and Outwash Hills
61006	342Ge61	Wind River Range Glacial Till and Outwash Hills
61007	342Ge61	Wind River Range Glacial Till and Outwash Hills
61008	342Ga61	Wind River Range Glacial Till and Outwash Hills
61009	342Ge61	Wind River Range Glacial Till and Outwash Hills
71001	342Gd71	Exterior Washakie Basin Rolling Plains
71002	342Xa71	Great Divide Basin Rolling Plains
71003	342Gd71	Interior Washakie Basin Rolling Plains
71004	342Ga71	Killpecker Creek Rolling Plains
71005	342Ga71	Little Snake River Rolling Plains
71006	342Ga71	Muddy Creek Rolling Plains
71007	342Gc71	Rock Springs Uplift Interior Basin
71008	342Ga71	Vermillion Creek-Alkali Creek Rolling Plains
72001	342Ga72	Blacks Fork Rolling Plains and Alluvial Valleys
72002	342Ga72	Henrys Fork Rolling Plains and Alluvial Valleys
72003	342Ge72	Upper Green River Basin Rolling Plains and Alluvial Valleys
73001	342Ga73	Lower Green River Basin Rolling Plains and Tablelands
73002	342Ga73	Lower Green River Basin Rolling Plains and Tablelands
75001	342Gd75	Sand Creek Channeled Plains
81001	342Ea81	Bear River Valley (Structural Valley)
81002	342Ea81	Bear River Valley (Structural Valley)
81003	342Ea81	Bear River Valley (Structural Valley)
81004	342Ea81	Cumberland Flats (Structural Valley)
81005	M331D-81	Star Valley (Structural Valley)
81006	M331D-81	Star Valley (Structural Valley)
83001	342Ga83	Big Sandy Reservoir
83002	342Ge83	Boulder Lake
83003	342Ga83	Flaming Gorge Reservoir
83004	342Ga83	Flaming Gorge Reservoir
83005	342Ga83	Fontenelle Reservoir
83006	342Ge83	Fremont Lake
83007	342Ea83	Naughton Reservoir
83008	342Ge83	New Fork Lakes
83009	M331D-83	Palisades Reservoir
83010	M331D-83	Palisades Reservoir
83011	342Ge83	Willow Lake
83012	342Ea83	Woodruff Narrows Reservoir

Table 3. Areas of delineated land units in southwest Wyoming. Names of the land units associated with the land unit codes are presented in Table 1 of the appendix. The polygon ID is the identification number assigned to a polygon of the Landtype Association coverage. When a Landtype Association (LTA) consists of more than one polygon, the polygons are listed separately.

Land Unit Code	Hierarchy Level	Polygon ID	Kilometer^2	Hectares	Miles^2	Acres
340	Division		51,897.24	5,189,724	20,037.52	12,823,808
342	Province		51,897.24	5,189,724	20,037.52	12,823,808
342E	Section		5,086.65	508,665	1,963.96	1,256,912
342Ea	Subsection		5,086.65	508,665	1,963.96	1,256,912
342Ea24	LTA		1,059.04	105,904	408.89	261,688
		24001	983.78	98,378	379.84	243,092
		24002	75.26	7,526	29.06	18,596
342Ea25	LTA		2,192.62	219,262	846.57	541,795
		25001	1,763.16	176,316	680.76	435,676
		25002	293.96	29,396	113.50	72,638
		25003	135.50	13,550	52.32	33,481
342Ea51	LTA		805.50	80,550	311.00	199,039
		51006	691.20	69,120	266.87	170,795
		51007	114.30	11,430	44.13	28,244
342Ea81	LTA		1,017.18	101,718	392.73	251,346
		81001	397.19	39,719	153.35	98,146
		81002	215.77	21,577	83.31	53,317
		81003	4.91	491	1.90	1,214
		81004	399.31	39,931	154.17	98,670
342Ea83	LTA		12.32	1,232	4.75	3,043
		83007	5.60	560	2.16	1,384
		83012	6.71	671	2.59	1,659
342G	Section		36,990.70	3,699,070	14,282.11	9,140,403
342Ga	Subsection		23,730.85	2,373,085	9,162.48	5,863,892
342Ga21	LTA		155.95	15,595	60.21	38,535
		21001	28.93	2,893	11.17	7,149
		21007	127.02	12,702	49.04	31,386
342Ga22	LTA	22001	89.14	8,914	34.42	22,027
342Ga23	LTA	23002	641.75	64,175	247.78	158,576
342Ga33	LTA	33001	1,155.85	115,585	446.27	285,610
342Ga34	LTA	34001	1,644.01	164,401	634.75	406,235
342Ga35	LTA		599.98	59,998	231.65	148,256
		35001	403.31	40,331	155.72	99,659
		35002	122.11	12,211	47.15	30,174
		35003	35.11	3,511	13.55	8,675
		35004	39.45	3,945	15.23	9,748
342Ga36	LTA		444.28	44,428	171.54	109,781
		36001	51.06	5,106	19.71	12,617
		36002	184.12	18,412	71.09	45,495
		36003	101.07	10,107	39.02	24,974
		36004	33.73	3,373	13.02	8,334
		36006	18.18	1,818	7.02	4,492
		36007	15.95	1,595	6.16	3,941
		36008	40.18	4,018	15.51	9,928
342Ga41	LTA	41004	56.59	5,659	21.85	13,983
342Ga51	LTA		1,239.94	123,994	478.74	306,389
		51004	1,172.86	117,286	452.84	289,813

Table 3 continued

Land Unit Code	Hierarchy Level	Polygon ID	Kilometer^2	Hectares	Miles^2	Acres
		51011	64.72	6,472	24.99	15,994
		51012	2.36	236	0.91	582
342Ga52	LTA		208.49	20,849	80.50	51,518
		52004	111.87	11,187	43.19	27,643
		52005	96.62	9,662	37.30	23,874
342Ga61	LTA		85.12	8,512	32.86	21,033
		61003	46.55	4,655	17.97	11,503
		61004	18.87	1,887	7.29	4,663
		61008	19.70	1,970	7.61	4,868
342Ga71	LTA		2,259.70	225,970	872.47	558,372
		71004	354.03	35,403	136.69	87,481
		71005	28.35	2,835	10.95	7,005
		71006	309.13	30,913	119.35	76,385
		71008	1,568.19	156,819	605.48	387,501
342Ga72	LTA		937.51	93,751	361.97	231,658
		72001	875.79	87,579	338.14	216,407
		72002	61.72	6,172	23.83	15,251
342Ga73	LTA		14,057.50	1,405,750	5,427.60	3,473,609
		73001	14,023.73	1,402,373	5,414.56	3,465,265
		73002	33.77	3,377	13.04	8,344
342Ga83	LTA		155.04	15,504	59.86	38,310
		83001	8.94	894	3.45	2,208
		83003	113.69	11,369	43.89	28,092
		83004	0.82	82	0.32	202
		83005	31.60	3,160	12.20	7,809
342Gc	Subsection		3,988.10	398,810	1,539.81	985,461
342Gc36	LTA	36005	456.74	45,674	176.35	112,861
342Gc51	LTA	51009	2,827.96	282,796	1,091.88	698,789
342Gc71	LTA	71007	703.40	70,340	271.58	173,810
342Gd	Subsection		4,724.96	472,496	1,824.31	1,167,537
342Gd21	LTA		148.94	14,894	57.51	36,804
		21003	98.47	9,847	38.02	24,331
		21005	50.48	5,048	19.49	12,473
342Gd41	LTA		73.92	7,392	28.54	18,265
		41001	34.41	3,441	13.29	8,502
		41003	39.51	3,951	15.25	9,763
342Gd51	LTA		713.08	71,308	275.32	176,201
		51002	141.62	14,162	54.68	34,994
		51005	571.46	57,146	220.64	141,207
342Gd52	LTA		520.35	52,035	200.91	128,580
		52002	438.03	43,803	169.12	108,236
		52003	82.33	8,233	31.79	20,343
342Gd71	LTA		3,002.33	300,233	1,159.20	741,875
		71001	858.07	85,807	331.30	212,028
		71003	2,144.26	214,426	827.90	529,847
342Gd75	LTA	75001	266.34	26,634	102.83	65,812
342Ge	Subsection		4,546.80	454,680	1,755.52	1,123,513
342Ge23	LTA	23001	503.87	50,387	194.55	124,507
342Ge36	LTA	36009	136.92	13,692	52.86	33,832
342Ge61	LTA		519.02	51,902	200.39	128,250
		61001	73.59	7,359	28.41	18,185
		61002	43.10	4,310	16.64	10,651
		61005	252.82	25,282	97.61	62,472
		61006	88.03	8,803	33.99	21,751
		61007	35.09	3,509	13.55	8,671
		61009	26.39	2,639	10.19	6,520

Table 3 continued

Land Unit Code	Hierarchy Level	Polygon ID	Kilometer^2	Hectares	Miles^2	Acres
342Ge72	LTA	72003	3,347.06	334,706	1,292.30	827,058
342Ge83	LTA		39.92	3,992	15.41	9,865
		83002	6.94	694	2.68	1,714
		83006	20.52	2,052	7.92	5,072
		83008	5.12	512	1.98	1,266
		83011	7.34	734	2.83	1,813
342X	Section		9,819.88	981,988	3,791.46	2,426,493
342Xa	Subsection		9,819.88	981,988	3,791.46	2,426,493
342Xa21	LTA		82.63	8,263	31.90	20,418
		21002	27.75	2,775	10.71	6,857
		21004	14.55	1,455	5.62	3,594
		21006	40.33	4,033	15.57	9,967
342Xa23	LTA	23003	192.53	19,253	74.34	47,574
342Xa41	LTA	41002	18.37	1,837	7.09	4,540
342Xa51	LTA		1,102.44	110,244	425.65	272,412
		51001	284.68	28,468	109.92	70,345
		51003	66.96	6,696	25.85	16,547
		51008	718.00	71,800	277.22	177,418
		51010	32.79	3,279	12.66	8,102
342Xa52	LTA		40.18	4,018	15.51	9,929
		52001	31.68	3,168	12.23	7,828
		52006	8.50	850	3.28	2,101
342Xa71	LTA	71002	8,383.73	838,373	3,236.96	2,071,620
M330	Division		10,734.06	1,073,406	4,144.42	2,652,386
M331	Province		10,734.06	1,073,406	4,144.42	2,652,386
M331D	Section		6,862.65	686,265	2,649.67	1,695,761
M331D-	Subsection		6,862.65	686,265	2,649.67	1,695,761
M331D-11	LTA		6,493.57	649,357	2,507.17	1,604,562
		11002	6,490.45	649,045	2,505.96	1,603,791
		11003	2.94	294	1.13	725
		11004	0.18	18	0.07	45
M331D-81	LTA		365.57	36,557	141.15	90,332
		81005	360.08	36,008	139.03	88,975
		81006	5.49	549	2.12	1,357
M331D-83	LTA		3.51	351	1.36	868
		83009	2.09	209	0.81	517
		83010	1.42	142	0.55	350
M331E	Section		385.87	38,587	148.98	95,347
M331Ea	Subsection	11006	385.87	38,587	148.98	95,347
M331I	Section		417.36	41,736	161.14	103,129
M331Iu	Subsection	11005	417.36	41,736	161.14	103,129
M331J	Section	11007	2,635.22	263,522	1,017.46	651,163
M331X	Section	11001	432.96	43,296	167.17	106,985

93

Table 4. Elevation data for delineated land units in southwest Wyoming. See the methods sections for information on how the statistics were calculated using 90 m DEM data. Names of the land units associated with the land unit codes are presented in Table 1 of the Appendix. The polygon ID is the identification number assigned to a polygon of the Landtype Association coverage. When a Landtype Association (LTA) consists of more than one polygon, the polygons are listed separately.

Land Unit Code	Hierarchy Level	Polygon ID	Elevation (meters)			
			Min	Max	Mean	Std
340	Division		1,841	3,048	2,130.42	134.42
342	Province		1,841	3,048	2,130.42	134.42
342E	Section		1,846	2,621	2,169.27	128.23
342Ea	Subsection		1,846	2,621	2,169.27	128.23
342Ea24	LTA		1,926	2,621	2,148.47	125.08
		24001	1,926	2,621	2,155.14	126.54
		24002	1,950	2,195	2,060.44	49.67
342Ea25	LTA		1,849	2,590	2,224.08	96.16
		25001	2,006	2,590	2,239.14	85.52
		25002	2,110	2,458	2,218.11	52.29
		25003	1,849	2,316	2,039.82	106.71
342Ea51	LTA		1,975	2,543	2,188.89	101.08
		51006	1,975	2,543	2,188.40	106.94
		51007	2,065	2,365	2,191.89	53.20
342Ea81	LTA		1,846	2,422	2,058.54	134.68
		81001	1,846	2,133	1,929.06	46.63
		81002	1,963	2,422	2,192.81	121.04
		81003	1,944	2,004	1,968.55	18.16
		81004	1,999	2,321	2,116.02	79.68
342Ea83	LTA		1,963	2,232	2,073.14	119.13
		83007	2,194	2,232	2,202.48	8.83
		83012	1,963	2,001	1,963.76	3.67
342G	Section		1,841	2,987	2,134.51	144.15
342Ga	Subsection		1,841	2,948	2,115.98	148.69
342Ga21	LTA		2,071	2,765	2,344.36	134.41
		21001	2,071	2,765	2,352.37	161.36
		21007	2,100	2,745	2,342.57	127.53
342Ga22	LTA	22001	2,183	2,682	2,358.74	109.74
342Ga23	LTA	23002	2,062	2,623	2,258.84	75.78
342Ga33	LTA	33001	2,011	2,658	2,326.00	119.19
342Ga34	LTA	34001	1,841	2,635	2,077.73	146.55
342Ga35	LTA		1,980	2,438	2,147.30	69.77
		35001	1,980	2,256	2,137.84	53.20
		35002	2,039	2,438	2,208.34	87.75
		35003	1,995	2,195	2,117.12	48.69
		35004	1,988	2,134	2,082.13	40.64
342Ga36	LTA		1,944	2,948	2,419.74	173.30
		36001	1,944	2,455	2,199.87	94.03
		36002	2,088	2,604	2,394.83	122.80
		36003	2,173	2,804	2,507.14	150.43
		36004	2,434	2,948	2,705.03	114.74
		36006	2,095	2,634	2,344.26	126.02
		36007	2,255	2,560	2,415.29	85.73
		36008	2,096	2,677	2,388.38	132.95
342Ga41	LTA	41004	1,865	2,316	2,071.11	113.90

Table 4 continued

Land Unit Code	Hierarchy Level	Polygon ID	Elevation [meters] Min	Max	Mean	Std
342Ga51	LTA		1,841	2,521	2,133.38	112.29
		51004	1,937	2,521	2,140.19	109.36
		51011	1,841	2,322	2,010.50	84.54
		51012	1,841	1,908	1,875.14	17.06
342Ga52	LTA		2,012	2,438	2,224.77	64.51
		52004	2,012	2,338	2,207.56	66.10
		52005	2,134	2,438	2,244.69	56.41
342Ga61	LTA		2,195	2,743	2,463.67	124.05
		61003	2,316	2,743	2,530.69	103.86
		61004	2,325	2,643	2,451.08	80.42
		61008	2,195	2,460	2,316.07	36.68
342Ga71	LTA		1,860	2,649	2,150.55	131.93
		71004	1,865	2,352	2,029.37	78.15
		71005	1,860	1,918	1,883.02	8.20
		71006	1,872	2,256	2,032.81	76.97
		71008	1,939	2,649	2,205.87	110.44
342Ga72	LTA		1,987	2,704	2,220.13	175.67
		72001	1,987	2,704	2,210.63	175.98
		72002	2,256	2,574	2,369.10	74.29
342Ga73	LTA		1,841	2,759	2,066.75	110.62
		73001	1,841	2,759	2,065.85	109.20
		73002	2,356	2,571	2,441.21	32.64
342Ga83	LTA		1,841	2,073	1,884.76	71.49
		83001	2,048	2,073	2,052.23	5.74
		83003	1,841	1,951	1,842.93	7.29
		83004	1,841	1,845	1,842.12	1.12
		83005	1,957	2,073	1,985.63	13.02
342Gc	Subsection		1,889	2,633	2,133.07	116.18
342Gc36	LTA	36005	2,048	2,633	2,311.69	104.88
342Gc51	LTA	51009	1,889	2,499	2,124.68	92.00
342Gc71	LTA	71007	1,914	2,348	2,050.81	87.10
342Gd	Subsection		1,866	2,648	2,105.44	96.55
342Gd21	LTA		2,037	2,395	2,186.15	62.18
		21003	2,037	2,395	2,177.89	64.93
		21005	2,094	2,316	2,202.28	52.81
342Gd41	LTA		2,010	2,256	2,110.14	61.76
		41001	2,041	2,256	2,139.89	71.88
		41003	2,010	2,144	2,084.26	34.61
342Gd51	LTA		1,866	2,595	2,147.51	128.20
		51002	1,866	2,134	1,955.53	45.43
		51005	2,042	2,595	2,193.83	94.14
342Gd52	LTA		1,935	2,648	2,174.21	140.14
		52002	1,935	2,648	2,202.54	134.82
		52003	1,940	2,108	2,025.04	29.36
342Gd71	LTA		1,889	2,316	2,087.87	65.01
		71001	1,889	2,267	2,045.90	58.10
		71003	1,977	2,316	2,104.67	59.83
342Gd75	LTA	75001	1,889	2,186	2,012.01	51.80
342Ge	Subsection		1,988	2,987	2,262.36	114.50
342Ge23	LTA	23001	1,988	2,987	2,329.41	181.97
342Ge36	LTA	36009	2,136	2,316	2,247.55	33.16
342Ge61	LTA		2,072	2,736	2,339.46	82.22
		61001	2,307	2,580	2,392.99	50.50
		61002	2,072	2,736	2,269.92	123.34
		61005	2,191	2,639	2,330.09	75.07
		61006	2,255	2,621	2,368.78	59.73

Table 4 continued

Land Unit Code	Hierarchy Level	Polygon ID	Elevation [meters] Min	Max	Mean	Std
		61007	2,214	2,589	2,348.59	79.63
		61009	2,185	2,499	2,283.88	62.01
342Ge72	LTA	72003	2,030	2,613	2,240.51	97.95
342Ge83	LTA		2,240	2,515	2,296.41	57.03
		83002	2,240	2,259	2,241.27	2.82
		83006	2,260	2,441	2,266.24	15.44
		83008	2,383	2,495	2,387.44	13.54
		83011	2,357	2,515	2,368.69	20.91
342X	Section		1,950	3,048	2,094.95	81.40
342Xa	Subsection		1,950	3,048	2,094.95	81.40
342Xa21	LTA		2,067	3,048	2,358.84	144.90
		21002	2,101	3,048	2,390.15	187.01
		21004	2,067	2,638	2,242.15	120.95
		21006	2,195	2,743	2,379.49	87.72
342Xa23	LTA	23003	2,146	2,641	2,282.87	65.94
342Xa41	LTA	41002	2,124	2,255	2,168.57	32.76
342Xa51	LTA		1,982	2,603	2,157.24	93.66
		51001	1,982	2,438	2,124.69	91.02
		51003	2,011	2,380	2,139.67	79.10
		51008	1,997	2,603	2,169.96	93.76
		51010	2,116	2,415	2,197.24	52.69
342Xa52	LTA		2,171	2,499	2,321.68	81.69
		52001	2,171	2,499	2,318.38	90.59
		52006	2,279	2,377	2,334.09	26.93
342Xa71	LTA	71002	1,950	2,377	2,076.60	61.10
M330	Division		1,716	4,023	2,601.55	375.12
M331	Province		1,716	4,023	2,601.55	375.12
M331D	Section		1,716	3,414	2,441.77	304.66
M331D-	Subsection		1,716	3,414	2,441.77	304.66
M331D-11	LTA		1,716	3,414	2,474.13	279.63
		11002	1,716	3,414	2,474.47	279.25
		11003	1,716	1,790	1,743.80	18.89
		11004	1,767	1,803	1,775.17	10.64
M331D-81	LTA		1,716	2,285	1,873.37	83.88
		81005	1,716	2,285	1,875.45	82.73
		81006	1,716	1,823	1,735.02	18.53
M331D-83	LTA		1,716	1,757	1,717.84	5.18
		83009	1,716	1,757	1,717.68	5.33
		83010	1,716	1,739	1,718.07	4.93
M331E	Section		2,311	2,962	2,693.35	125.12
M331Ea	Subsection	11006	2,311	2,962	2,693.35	125.12
M331I	Section		2,240	3,294	2,723.85	220.84
M331Iu	Subsection	11005	2,240	3,294	2,723.85	220.84
M331J	Section	11007	2,194	4,023	2,959.24	329.05
M331X	Section	11001	2,194	3,536	2,763.91	236.57

Table 5. Annual precipitation data for delineated land units in southwest Wyoming. See the methods sections for information on how the statistics were calculated. Names of the land units associated with the land unit codes are presented in Table 1 of the Appendix. The polygon ID is the identification number assigned to a polygon of the land unit coverage. When a Landtype Association (LTA) consists of more than one polygon, the polygons are listed separately.

Land Unit Code	Hierarchy Level	Polygon ID	Annual Precipitation [millimeters] Min	Max	Mean	Std
340	Division		170	899	275.80	99.21
342	Province		170	899	275.80	99.21
342E	Section		230	782	373.41	77.54
342Ea	Subsection		230	782	373.41	77.54
342Ea24	LTA		253	609	373.42	65.01
		24001	253	609	377.54	64.88
		24002	257	383	319.64	36.42
342Ea25	LTA		242	662	407.12	70.57
		25001	242	662	399.42	69.64
		25002	326	560	439.00	57.83
		25003	290	552	438.14	79.36
342Ea51	LTA		230	782	309.83	45.75
		51006	230	782	310.99	48.08
		51007	254	361	302.80	26.66
342Ea81	LTA		238	782	351.27	84.26
		81001	290	609	355.29	60.23
		81002	265	536	416.91	74.18
		81003	257	316	275.80	17.90
		81004	238	782	312.72	87.18
342Ea83	LTA		290	434	357.34	51.30
		83007	408	434	412.45	3.10
		83012	290	316	310.74	10.45
342G	Section		170	899	275.94	102.23
342Ga	Subsection		170	899	271.74	100.19
342Ga21	LTA		237	597	386.46	97.94
		21001	407	588	491.26	83.05
		21007	237	597	362.60	84.47
342Ga22	LTA	22001	277	392	297.28	19.00
342Ga23	LTA	23002	218	344	263.04	19.07
342Ga33	LTA	33001	372	899	532.92	96.15
342Ga34	LTA	34001	192	531	253.42	45.13
342Ga35	LTA		193	334	249.45	35.98
		35001	193	274	238.34	23.71
		35002	216	334	297.38	37.70
		35003	221	255	243.28	5.13
		35004	193	251	220.17	16.07
342Ga36	LTA		239	615	391.13	90.09
		36001	253	304	289.39	15.97
		36002	239	479	369.94	67.52
		36003	290	531	434.01	67.90
		36004	329	615	542.51	103.79
		36006	321	460	400.00	37.90
		36007	264	399	358.26	60.49
		36008	320	552	391.45	78.90
342Ga41	LTA	41004	200	278	243.49	24.45

Table 5 continued

Land Unit Code	Hierarchy Level	Polygon ID	Annual Precipitation [millimeters] Min	Max	Mean	Std
342Ga51	LTA		200	565	323.21	75.48
		51004	200	565	324.15	76.62
		51011	232	460	309.55	47.12
		51012	228	238	229.18	2.31
342Ga52	LTA		220	354	268.03	23.10
		52004	220	267	253.58	11.23
		52005	238	354	284.74	22.00
342Ga61	LTA		273	719	493.03	127.39
		61003	427	719	584.11	54.02
		61004	403	576	472.24	70.86
		61008	273	335	297.76	16.87
342Ga71	LTA		174	615	291.17	79.63
		71004	200	288	237.67	16.91
		71005	278	371	333.29	30.42
		71006	190	388	256.21	58.27
		71008	174	615	309.39	84.46
342Ga72	LTA		186	713	348.95	143.32
		72001	186	713	343.23	145.37
		72002	320	576	430.00	71.36
342Ga73	LTA		170	744	235.14	62.21
		73001	170	744	234.84	61.94
		73002	288	407	360.68	44.48
342Ga83	LTA		179	305	218.54	18.04
		83001	206	213	209.12	0.78
		83003	192	305	224.84	15.57
		83004	212	241	233.75	12.56
		83005	179	223	198.15	11.45
342Gc	Subsection		174	367	242.69	29.18
342Gc36	LTA	36005	227	367	274.10	16.78
342Gc51	LTA	51009	174	364	236.91	29.79
342Gc71	LTA	71007	222	297	245.54	17.12
342Gd	Subsection		170	371	222.65	42.18
342Gd21	LTA		175	297	235.95	43.91
		21003	207	297	260.99	32.05
		21005	175	204	187.06	8.58
342Gd41	LTA		176	235	200.32	11.91
		41001	176	215	192.87	10.09
		41003	191	235	206.81	9.28
342Gd51	LTA		174	371	228.19	42.53
		51002	258	371	293.21	14.80
		51005	174	305	212.07	29.92
342Gd52	LTA		223	334	284.55	21.31
		52002	257	330	285.61	17.53
		52003	223	334	278.96	34.62
342Gd71	LTA		170	322	208.42	34.45
		71001	175	308	210.36	39.01
		71003	170	322	207.64	32.42
342Gd75	LTA	75001	186	296	245.95	26.40
342Ge	Subsection		216	880	382.41	121.21
342Ge23	LTA	23001	498	880	583.20	87.18
342Ge36	LTA	36009	245	340	313.56	19.78
342Ge61	LTA		276	767	409.49	103.26
		61001	457	746	546.32	58.19
		61002	508	767	585.76	63.70
		61005	293	530	355.24	45.55
		61006	385	696	446.37	38.53

Table 5 continued

Land Unit Code	Hierarchy Level	Polygon ID	Annual Precipitation [millimeters] Min	Max	Mean	Std
		61007	276	369	298.29	22.28
		61009	276	371	283.62	6.49
342Ge72	LTA	72003	216	803	350.82	98.70
342Ge83	LTA		299	477	380.06	48.86
		83002	299	353	339.76	12.04
		83006	304	477	362.99	40.95
		83008	448	450	449.90	0.44
		83011	351	477	416.70	32.42
342X	Section		172	477	224.72	44.55
342Xa	Subsection		172	477	224.72	44.55
342Xa21	LTA		306	423	335.28	22.27
		21002	306	342	331.73	14.51
		21004	330	374	354.80	15.55
		21006	307	423	330.66	24.82
342Xa23	LTA	23003	216	384	269.13	32.64
342Xa41	LTA	41002	247	309	260.20	22.53
342Xa51	LTA		229	477	281.39	40.27
		51001	241	339	288.08	22.58
		51003	232	326	262.70	29.04
		51008	229	477	279.40	45.93
		51010	280	349	305.07	20.58
342Xa52	LTA		257	378	316.36	39.04
		52001	257	346	300.18	26.17
		52006	332	378	377.07	2.25
342Xa71	LTA	71002	172	384	214.64	36.62
M330	Division		259	1,536	738.96	223.90
M331	Province		259	1,536	738.96	223.90
M331D	Section		259	1,536	771.56	246.29
M331D-	Subsection		259	1,536	771.56	246.29
M331D-11	LTA		259	1,536	787.81	242.47
		11002	259	1,536	787.93	242.46
		11003	412	554	536.25	46.96
		11004	428	428	428.00	0.00
M331D-81	LTA		384	943	485.62	85.36
		81005	384	943	485.92	85.97
		81006	441	473	466.22	7.91
M331D-83	LTA		468	554	503.58	41.67
		83009	468	473	469.20	2.13
		83010	554	554	554.00	0.00
M331E	Section		325	838	627.80	79.53
M331Ea	Subsection	11006	325	838	627.80	79.53
M331I	Section		485	1,277	872.41	216.35
M331Iu	Subsection	11005	485	1,277	872.41	216.35
M331J	Section	11007	273	992	649.24	146.08
M331X	Section	11001	520	922	738.76	81.77

Table 6. Land cover data for delineated land units of southwest Wyoming. The data were calculated for individual polygons of the Landtype Association coverage, which are identified by the polygon ID number followed by the corresponding land unit code (LUCode). Names associated with the land unit codes are presented in Table 1 of this Appendix, while the land cover codes are defined in Table 7 of this Appendix. Land cover types with areas less than 500 ha have been removed from the table in most cases. See the methods section for information on how the data were calculated.

Polygon ID (LUCode)	Land Cover Code	Area [ha]	Area as Percent of Total [%]
11001	42004	13,778.34	31.82
(M331X)	82002	9,809.44	22.66
	42001	6,886.10	15.90
	32006	4,923.70	11.37
	41001	4,830.24	11.16
	74002	2,538.62	5.86
	42007	516.16	1.19
11002	42004	194,970.84	30.04
(M331D-11)	82002	86,109.98	13.27
	32006	74,801.59	11.52
	42001	67,461.26	10.39
	41001	67,380.92	10.38
	42003	46,267.03	7.13
	32007	35,672.45	5.50
	74002	30,927.04	4.77
	21002	15,165.59	2.34
	62001	7,129.79	1.10
	42007	5,964.71	0.92
	42009	4,783.35	0.74
	21001	3,027.93	0.47
	31003	2,819.52	0.43
	32002	2,059.25	0.32
	61001	1,787.05	0.28
	74001	1,484.69	0.23
	31001	1,005.24	0.15
	32001	180.76	0.03
11003	41001	194.58	66.29
(M331D-11)	61001	95.77	32.63
11004	21002	18.39	100.00
(M331D-11)			
11005	42004	16,642.77	39.88
(M331Iu)	41001	10,507.77	25.18
	42001	9,469.24	22.69
	32006	2,625.02	6.29
	82002	1,882.08	4.51
	42007	423.88	1.02
	74002	185.11	0.44
11006	42004	19,511.23	50.56
(M331Ea)	41001	11,379.37	29.49
	32006	2,963.22	7.68
	32007	1,547.19	4.01
	42007	958.54	2.48
	42015	951.49	2.47
	42001	439.22	1.14
	21002	222.49	0.58
	61001	201.17	0.52
	52001	155.33	0.40
	82002	111.62	0.29
	62002	110.75	0.29
11007	42004	130,401.85	49.48
(M331J)	82002	60,669.03	23.02
	74002	27,414.44	10.40
	41001	15,458.16	5.87
	32006	14,074.54	5.34
	42001	5,649.92	2.14
	42007	3,157.35	1.20
	52001	1,722.25	0.65
	62001	1,324.21	0.50
	82001	1,102.92	0.42
	61001	952.36	0.36
	42003	847.79	0.32
	91001	643.28	0.24
21001	41001	1,762.89	60.93
(342Ga21)	32006	977.47	33.79
	32001	150.10	5.19
21002	32007	1,783.39	64.26
(342Xa21)	74001	633.10	22.81
	42004	320.12	11.54
21003	32007	7,588.69	77.07
(342Gd21)	32011	795.63	8.08
	31001	570.47	5.79
	32012	451.73	4.59
	32010	440.02	4.47
21004	32006	901.23	61.96
(342Xa21)	32007	374.50	25.75
	32013	177.41	12.20
21005	32007	2,807.94	55.63
(342Gd21)	74001	2,220.38	43.99
21006	32007	3,511.62	87.06
(342Xa21)	42004	521.84	12.94
21007	32007	11,690.62	92.04
(342Ga21)	21002	619.60	4.88
	32006	391.58	3.08
22001	32006	5,220.65	58.56
(342Ga22)	32007	3,348.69	37.57
	41001	201.76	2.26
	62001	143.19	1.61
23001	32006	18,765.07	37.24
(342Ge23)	42004	12,785.99	25.38
	41001	10,839.82	21.51
	42001	3,698.45	7.34
	62001	3,668.57	7.28
	21002	373.87	0.74
	82002	206.13	0.41

Table 6 continued

Polygon ID (LUCode)	Land Cover Code	Area [ha]	Area as Percent of Total [%]
23002	32007	51,343.52	80.01
(342Ga23)	32010	3,627.75	5.65
	73001	3,471.96	5.41
	62001	2,627.37	4.09
	32013	1,992.35	3.10
	74001	663.98	1.03
	32006	447.90	0.70
23003	32007	11,590.39	60.20
(342Xa23)	32010	3,563.60	18.51
	32011	2,037.21	10.58
	74001	1,879.49	9.76
	73001	182.24	0.95
24001	32007	65,617.51	66.70
(342Ea24)	32006	16,414.61	16.69
	32002	5,965.95	6.06
	42015	5,533.01	5.62
	41001	2,383.35	2.42
	62001	1,654.71	1.68
	21002	557.27	0.57
	11001	106.57	0.11
24002	32007	6,851.35	91.04
(342Ea24)	21002	395.45	5.25
	61001	277.95	3.69
25001	32007	90,350.60	51.24
(342Ea25)	32006	49,930.94	28.32
	42015	21,272.69	12.07
	62001	4,577.64	2.60
	32010	3,501.06	1.99
	41001	3,051.57	1.73
	21002	1,508.43	0.86
	21001	980.51	0.56
	32002	610.44	0.35
	52001	324.32	0.18
	42004	197.10	0.11
25002	32007	28,175.60	95.85
(342Ea25)	62001	472.52	1.61
	32006	367.66	1.25
	11001	193.92	0.66
	61001	137.55	0.47
25003	32007	13,377.18	98.73
(342Ea25)	21002	152.02	1.12
33001	32006	69,756.75	60.35
(342Ga33)	41001	28,476.87	24.64
	32007	3,928.18	3.40
	32001	3,624.61	3.14
	42004	3,509.97	3.04
	42007	2,894.58	2.50
	61001	1,766.01	1.53
	32008	873.68	0.76
	31001	735.92	0.64
34001	32007	97,225.09	59.14
(342Ga34)	42015	45,170.74	27.48
	32010	6,023.80	3.66
	62001	5,892.88	3.58
	32012	3,681.47	2.24
	74001	3,651.82	2.22
	11001	1,007.57	0.61
	52001	642.08	0.39
	61001	402.25	0.24
	41001	367.71	0.22
	32008	163.95	0.10
	32006	159.15	0.10
35001	32007	30,804.64	76.38
(342Ga35)	32010	7,740.80	19.19
	32012	1,084.30	2.69
	61001	268.75	0.67
	21002	254.80	0.63
	52001	127.82	0.32
35002	32007	12,211.20	100.00
(342Ga35)			
35003	32010	1,867.39	53.19
(342Ga35)	32007	1,606.11	45.75
35004	32007	3,482.19	88.27
(342Ga35)	32010	430.14	10.90
36001	32007	2,031.32	39.78
(342Ga36)	32010	1,430.77	28.02
	42015	1,118.45	21.90
	74001	525.56	10.29
36002	32007	11,545.19	62.71
(342Ga36)	42015	3,984.59	21.64
	32002	1,796.22	9.76
	62001	718.98	3.91
	32010	204.42	1.11
	74001	162.13	0.88
36003	42004	2,360.07	23.35
(342Ga36)	41001	2,134.58	21.12
	32006	1,923.00	19.03
	42015	1,917.90	18.98
	32008	1,049.21	10.38
	32007	667.21	6.60
36004	41001	958.39	28.42
(342Ga36)	42004	810.21	24.02
	32006	675.44	20.03
	31001	532.69	15.79
	42015	385.81	11.44
36005	32007	23,750.77	52.00
(342Gc36)	42015	11,141.37	24.39
	32006	7,792.76	17.06
	62001	1,294.33	2.83
	41001	1,190.53	2.61
	32010	403.56	0.88
36006	32008	1,045.11	57.49
(342Ga36)	42015	735.43	40.45
36007	42015	650.16	40.77
(342Ga36)	32002	486.79	30.52

Table 6 continued

Polygon ID (LUCode)	Land Cover Code	Area [ha]	Area as Percent of Total [%]
	32007	231.24	14.50
	74001	226.66	14.21
36008 (342Ga36)	42015	3,537.31	88.04
	41001	330.99	8.24
	32007	149.70	3.73
36009 (342Ge36)	32007	13,691.77	100.00
41001 (342Gd41)	32007	1,461.84	43.07
	74001	803.28	23.35
	32011	788.66	22.92
	32010	354.70	10.31
41002 (342Xa41)	74001	1,136.61	61.86
	32010	510.63	27.79
	32007	190.01	10.34
41003 (342Gd41)	32007	3,880.59	98.22
41004 (342Ga41)	74001	2,552.19	45.10
	32007	1,165.08	20.59
	32010	1,085.84	19.19
	42015	820.46	14.50
51001 (342Xa51)	32007	24,706.24	86.78
	32012	2,105.69	7.40
	32011	1,653.91	5.81
51002 (342Gd51)	32007	12,097.40	85.42
	62001	968.46	6.84
	42015	687.90	4.86
	74001	205.21	1.45
	32012	183.10	1.29
51003 (342Xa51)	32007	4,250.28	63.47
	74001	2,392.70	35.73
51004 (342Ga51)	32007	65,631.08	55.96
	32006	35,051.36	29.89
	41001	4,623.30	3.94
	21002	2,680.72	2.29
	32010	2,446.57	2.09
	42015	2,285.96	1.95
	32012	1,872.36	1.60
	62001	1,248.06	1.06
	32011	615.36	0.52
	61001	542.99	0.46
	32001	287.94	0.25
51005 (342Gd51)	32007	41,399.95	72.45
	32010	8,312.49	14.55
	42009	1,684.03	2.95
	32011	1,476.79	2.58
	74001	1,288.78	2.26
	62001	1,077.17	1.88
	32012	1,003.51	1.76
	42015	902.82	1.58
51006 (342Ea51)	32007	55,207.68	79.87
	42015	7,981.84	11.55
	32010	3,139.52	4.54
	41001	1,096.05	1.59
	62001	927.57	1.34
	21002	311.02	0.45
	61001	231.55	0.33
	32002	111.86	0.16
51007 (342Ea51)	32007	10,333.76	90.41
	75001	567.51	4.96
	62001	429.39	3.76
51008 (342Xa51)	32007	54,891.72	76.45
	32010	5,424.91	7.56
	74001	3,902.45	5.44
	32008	3,733.06	5.20
	32011	2,386.45	3.32
	32012	1,413.66	1.97
51009 (342Gc51)	32007	190,004.18	67.19
	42015	35,722.73	12.63
	32010	30,461.91	10.77
	32012	8,036.66	2.84
	62001	5,832.11	2.06
	75001	3,637.60	1.29
	73001	3,370.19	1.19
	11001	2,050.77	0.73
	32011	1,707.78	0.60
	74001	1,179.24	0.42
	32006	378.42	0.13
	52001	222.02	0.08
	41001	147.43	0.05
51010 (342Xa51)	32007	3,255.67	99.30
51011 (342Ga51)	32007	3,758.59	58.07
	42015	2,228.00	34.42
	32008	466.78	7.21
51012 (342Ga51)	32007	227.90	96.71
52001 (342Xa52)	32007	1,926.18	60.80
	42004	1,071.71	33.83
	62001	156.54	4.94
52002 (342Gd52)	32007	25,315.49	57.79
	42015	15,899.01	36.30
	74001	1,756.89	4.01
	32010	652.06	1.49
	42009	109.34	0.25
52003 (342Gd52)	32007	5,265.73	63.96
	32011	1,288.76	15.65
	62001	1,017.07	12.35
	32010	658.38	8.00
52004 (342Ga52)	32007	9,791.82	87.53
	42015	985.42	8.81
	32010	404.27	3.61

Table 6 continued

Polygon ID (LUCode)	Land Cover Code	Area [ha]	Area as Percent of Total [%]
52005	32007	6,562.45	67.92
(342Ga52)	74001	1,929.04	19.97
	32006	1,001.52	10.37
	42009	106.98	1.11
52006	74001	542.49	63.82
(342Xa52)	32007	307.61	36.18
61001	32006	6,759.60	91.85
(342Ge61)	41001	542.56	7.37
61002	42001	2,306.96	53.52
(342Ge61)	42004	1,399.53	32.47
	32006	509.10	11.81
61003	32007	2,529.37	54.34
(342Ga61)	42004	1,204.66	25.88
	41001	689.35	14.81
	42001	222.51	4.78
61004	32006	1,136.98	60.26
(342Ga61)	21002	595.58	31.56
	61001	118.12	6.26
61005	32006	19,449.39	76.93
(342Ge61)	52001	1,373.01	5.43
	42004	1,052.21	4.16
	42003	1,021.55	4.04
	21002	830.67	3.29
	41001	609.06	2.41
	62001	469.81	1.86
	42001	389.44	1.54
61006	32006	6,752.29	76.71
(342Ge61)	21002	1,624.23	18.45
	41001	210.61	2.39
	62001	139.48	1.58
61007	32006	3,036.81	86.54
(342Ge61)	42004	417.16	11.89
61008	32006	1,850.59	93.94
(342Ga61)	32007	95.19	4.83
61009	32006	2,356.54	89.31
(342Ge61)	41001	156.49	5.93
71001	32007	41,088.59	47.89
(342Gd71)	32011	23,299.92	27.15
	32010	12,208.98	14.23
	32012	8,544.02	9.96
	62001	626.23	0.73
71002	32007	541,819.97	64.63
(342Xa71)	32012	124,812.31	14.89
	32010	102,400.52	12.21
	32011	25,352.63	3.02
	32013	20,167.00	2.41
	73001	7,589.59	0.91
	71001	6,080.87	0.73
	74001	5,007.84	0.60
	62001	2,922.91	0.35
	52001	1,910.49	0.23
	31001	254.86	0.03
71003	32007	152,170.07	70.97
(342Gd71)	32010	24,655.05	11.50
	74001	23,996.37	11.19
	31001	4,408.75	2.06
	32011	3,619.74	1.69
	32012	3,048.52	1.42
	42015	1,610.58	0.75
	62001	919.03	0.43
71004	32007	15,564.04	43.96
(342Ga71)	32010	7,795.80	22.02
	74001	3,220.60	9.10
	32012	2,663.89	7.52
	73001	2,179.40	6.16
	32011	1,677.53	4.74
	42015	1,003.90	2.84
	11001	582.25	1.64
	32013	566.75	1.60
	62001	148.86	0.42
71005	21002	1,595.06	56.26
(342Ga71)	62001	860.31	30.35
	32007	238.40	8.41
71006	32007	14,350.29	46.42
(342Ga71)	62001	4,940.32	15.98
	21002	3,983.25	12.89
	32011	3,714.01	12.01
	42015	2,218.41	7.18
	32010	1,028.41	3.33
	32012	677.91	2.19
71007	32010	35,153.98	49.98
(342Gc71)	32007	23,419.31	33.29
	62001	4,029.31	5.73
	32012	4,024.34	5.72
	42015	3,129.05	4.45
	32006	259.81	0.37
	71001	211.92	0.30
	41001	112.41	0.16
71008	32007	95,001.13	60.58
(342Ga71)	32010	20,354.22	12.98
	42015	10,072.60	6.42
	31001	8,708.10	5.55
	62001	6,466.68	4.12
	32011	5,811.10	3.71
	74001	4,592.13	2.93
	32012	3,202.46	2.04
	32008	1,684.03	1.07
	41001	554.61	0.35
	32006	227.86	0.15
	62002	135.08	0.09
72001	21002	29,978.65	34.23
(342Ga72)	32007	26,656.12	30.44
	74001	13,852.05	15.82
	32006	6,325.47	7.22
	41001	3,122.16	3.56

Table 6 continued

Polygon ID (LUCode)	Land Cover Code	Area [ha]	Area as Percent of Total [%]
	61001	2,938.52	3.38
	42001	1,716.72	1.98
	32002	837.76	0.96
	32010	690.22	0.79
	62002	525.08	0.60
	11001	429.58	0.49
	42004	197.28	0.23
	62001	171.08	0.20
	42015	137.99	0.16
72002	21002	4,498.55	72.89
(342Ga72)	32006	1,309.00	21.21
	41001	160.00	2.59
	74001	154.43	2.50
72003	32007	160,561.72	47.97
(342Ge72)	21002	94,138.42	28.13
	32006	49,465.60	14.78
	62001	12,626.29	3.77
	61001	5,624.36	1.68
	41001	4,279.55	1.28
	42004	2,272.69	0.68
	21001	2,147.46	0.64
	32012	1,390.86	0.42
	74001	887.04	0.27
	32010	500.44	0.15
	31001	408.18	0.12
	11001	297.18	0.09
73001	32007	1,037,339.23	73.97
(342Ga73)	32010	198,732.07	14.17
	21002	31,226.15	2.23
	74001	26,221.15	1.87
	62001	25,520.94	1.82
	32006	25,228.70	1.80
	32012	20,981.87	1.50
	61001	8,874.51	0.63
	42015	8,103.82	0.58
	32011	4,827.26	0.34
	41001	4,051.74	0.29
	31001	2,054.12	0.15
	42004	1,886.63	0.13
	52001	1,688.21	0.12
	42001	1,226.22	0.09
	32013	925.86	0.07
	32002	816.40	0.06
	42009	799.17	0.06
	73001	735.57	0.05
	75001	660.01	0.05
	21001	262.51	0.02
	62002	208.80	0.01
73002	32006	2,771.44	82.07
(342Ga73)	62001	506.38	15.00
75001	32007	25,533.48	95.87
(342Gd75)	32012	622.30	2.34
	62001	344.29	1.29
81001	32007	18,550.02	46.70
(342Ea81)	21002	11,619.78	29.25
	62001	5,367.90	13.51
	31001	2,910.73	7.33
	32012	732.38	1.84
	32002	314.44	0.79
	42003	113.21	0.29
	32006	110.53	0.28
81002	21002	14,287.35	66.22
(342Ea81)	32007	3,861.22	17.90
	11001	2,043.74	9.47
	61001	983.91	4.56
	52001	313.22	1.45
81003	32007	309.49	63.01
(342Ea81)	21002	181.26	36.90
81004	32007	29,470.43	73.80
(342Ea81)	32010	5,141.01	12.87
	75001	1,697.34	4.25
	32006	1,541.38	3.86
	62001	959.78	2.40
	41001	634.95	1.59
	11001	364.10	0.91
81005	21002	19,981.54	55.49
(M331D-81)	21001	11,297.47	31.38
	41001	2,047.07	5.69
	61001	1,307.76	3.63
	62001	775.83	2.15
	32006	270.13	0.75
	11001	241.22	0.67
81006	32006	459.84	83.76
(M331D-81)	41001	81.29	14.81
83001	52001	619.73	69.36
(342Ga83)	32007	163.83	18.33
	21002	73.60	8.24
83002	52001	588.86	84.87
(342Ge83)	32006	104.78	15.10
83003	52001	9,273.72	81.57
(342Ga83)	32007	1,018.92	8.96
	62001	695.33	6.12
	32010	212.24	1.87
83004	21002	62.08	76.08
(342Ga83)	52001	13.48	16.52
	32007	6.04	7.40
83005	52001	2,437.72	77.14
(342Ga83)	32007	287.33	9.09
	62002	280.34	8.87
83006	52001	1,935.70	94.31
(342Ge83)	32006	58.60	2.86
83007	52001	547.20	97.68
(342Ea83)			
83008	52001	483.58	94.39
(342Ge83)	42004	28.74	5.61

Table 6 continued

Polygon ID (LUCode)	Land Cover Code	Area [ha]	Area as Percent of Total [%]
83009	74001	181.44	86.69
(M331D-83)	32006	21.05	10.06
83010	74001	116.93	82.45
(M331D-83)	61001	10.94	7.71
	41001	10.24	7.22
83011	52001	691.45	94.24
(342Ga83)	32006	40.20	5.48
83012	52001	621.51	92.57
(342Ea83)	32007	49.85	7.43

Table 7. Description of the land cover types of southwest Wyoming.

11001 Human settlements type

Towns and cities occupying greater than 100 hectares. Also can include residential areas on the outskirts of towns and cities. Often includes significant tree cover, especially by cottonwood species.

21001 Dry-land crops type

This type includes non-irrigated cropland, dryland improved pastures, fallow lands, rural development, ranch and farm facilities and shelter belts.

21002 Irrigated crops type

Any irrigated agricultural area. Includes most row crops, irrigated pastureland and hayfields and associated farm or ranch facilities and shelter belts.

31001 Mixed grass prairie type

This is a "catch-all" type for grasslands that contain a mixture of short grass and tall grass prairie species. These grasslands do not contain buffalo grass, considered an indicator of short grass prairie. Often occurs in patches intermixed with shrub species (i.e. *Artemisia tridentata*). When patchy, grass patches must occupy more than 50 percent of the landscape for the primary vegetation type to be classified as mixed grass. The vegetation may contain or be dominated by silver sagebrush. With the exception of silver sagebrush, trees or shrubs cannot occupy more than 25 percent of the total vegetative cover.

31003 Great Basin foothills grassland type

A mesic grass-forb mixture found in the far northwest corner of the state. Total shrub or tree cover cannot exceed 25 percent of the total vegetative cover. Related to "Palouse Prairie". This type needs further clarification. Significant lupine and arrowleaf balsamroot component.

32001 Mesic upland shrub type

This is a "catch-all" class which includes a variety of shrub communities that grow in relatively mesic sites in Wyoming, often in snow catchments or downslope from catchments or in ravines over a wide range of elevation. Most often Rocky Mountain maple, bigtooth maple, serviceberry, snowberry, wax currant and/or chokecherry are dominant or co-dominant, but other shrub species can be present. Mountain mahogany species cannot be dominant. Mesic shrubs must comprise more than 25 percent of the total vegetative cover.

Table 7 continued

32002 Xeric upland shrub type

Shrub community with shrub cover dominated by species of mountain mahogany. Shrub species must comprise more than 25 percent of the total vegetative cover.

32006 Mountain big sagebrush type

This shrub type is dominated by mountain big sagebrush. Often found with mixed grasses. Mountain big sagebrush must be the dominant shrub and total shrub cover must comprise more than 25 percent of the total vegetative cover. Sometimes occurs as patches of dense sagebrush with patches of mixed grasses. In this case, the sagebrush patches must comprise more than 50 percent of the total landscape area.

32007 Wyoming big sagebrush steppe type

This is a shrub steppe type with Wyoming big sagebrush the dominant shrub and with total shrub cover comprising more than 25 percent of the total vegetative cover. This type is variable in Wyoming and includes the full range from dense, homogeneous Wyoming big sagebrush to sparsely vegetated arid areas where Wyoming big sage is the dominant shrub. Often, patches of Wyoming big sagebrush are found with patches of mixed grasses. In these cases the type is classified as Wyoming big sagebrush steppe if the sagebrush patches occupy more than 50 percent of the total landscape area and as mixed grass if the grasses occupy more than 50 percent of the total area.

32008 Black sagebrush steppe type

Black sagebrush is the dominant shrub and total shrub cover comprises more than 25 percent of the total vegetative cover. Often mixed with grasses and with Wyoming big sagebrush.

32010 Desert shrub type

This type is a "catch-all" for a mixture of shrubs occurring in dry, saline habitats. Shrub cover is often dominated by *Atriplex confertifolia* but can be a mixture of Gardner's saltbush, black greasewood and/or desert cushion plants. When ground cover is pure *Atriplex gardneri* or pure *Sarcobatus vermiculatus* it is classified as such but when these species are mixed and dominance is unclear it is classified as desert shrub. This type also includes cushion plant communities found in Wyoming basins. Total shrub cover must comprise more than 25 percent of the total vegetative cover.

Table 7 continued

32011 Saltbush fans and flats type

Areas where Gardner's saltbush comprises more than 75 percent of the total vegetative cover. These relatively pure saltbush stands are often sparsely vegetated with bare soil constituting most of the land surface. Can be mixed with some grasses or shrubs if these comprise less than 25 percent of total vegetative cover.

32012 Greasewood fans and flats type

Areas where greasewood comprises more than 75 percent of the total shrub cover and where shrubs comprise more than 25 percent of the total vegetative cover. Often mixed with grasses. Greasewood is frequently found in riparian areas and classified as shrub riparian with the greasewood type entered as a secondary vegetation type within the polygon.

32013 Sand dune complex type

This type includes stabilized sand dune communities. Most of the land surface is comprised of old dune deposits with dune stabilizing species such as Indian ricegrass, *Psoralea lanceolata*, and rabbitbrush present as well as *Artemisia* species. Some patches of bare sand may be present but these do not dominate the landscape.

41001 Aspen forest type

Forest in which aspen dominates the canopy. Includes pure aspen forest and mixed conifer/aspen forest where aspen occupies more than 50 percent of the total canopy. Total canopy cover by trees must be greater than 25 percent.

42001 Spruce-fir intact type

Spruce-fir forest not significantly affected by logging. Engelmann spruce and/or subalpine fir must be dominant or co-dominant in the canopy and total canopy coverage by all tree species must be greater than 25 percent.

42003 Douglas fir type

Forest or woodland in which the canopy is dominated by Douglas fir. This type includes both intact Douglas fir forest and Douglas fir forest influenced by logging (when contiguous logged areas are smaller than 100 ha). Total forest cover must be greater than 25 percent.

Table 7 continued

42004 Lodgepole pine closed forest type

Forest in which lodgepole pine dominates the canopy and with a canopy closure greater than 25 percent. Engelmann spruce and subalpine fir may be mixed with the canopy trees or important in the understory, but cannot be the dominant canopy tree type. Can include dog-hair lodgepole stands. Logging activity is not significant in this type. (Logged conifer is a separate class).

42007 Logged conifer

Areas within lodgepole pine forest that are significantly affected by logging. This type consists of clearcut areas within a matrix of lodgepole pine forest and as such is a mosaic of standing forest and logged areas with logged areas covering more than 40 percent of the total ground area. The logged areas may be in early successional stages but are not classified as forest or woodland until regrowing trees achieve 25 percent canopy closure.

42009 Limber pine woodland and scrub type

Forest or woodland dominated by limber pine. This type includes the range of types from closed canopy forest dominated by limber pine to open limber pine woodland where trees constitute more than 25 percent of total vegetative cover. Often co-occurs with juniper woodland and/or with shrubs or grasses in the understory.

42015 Juniper woodland type

Woodland dominated by species of juniper. Woodland species must comprise more than 25 percent of the total vegetative cover. This type includes pinon-juniper woodlands as well as pure juniper woodlands. Often occurs with mountain mahogany species, big sagebrush and/or limber pine.

52001 Open water type

Any area of open water with area greater than 40 hectares. Includes lakes and reservoirs. Rivers are classified as one of the three riparian types and are not included in this type.

61001 Forest dominated riparian type

Riparian zones in which tree species dominate the vegetation of the riparian corridor. In Wyoming, these are usually cottonwood species, but can also be aspen, boxelder, or a variety of conifer species. Trees must occupy more than 25 percent of the vegetative cover within the riparian zone.

Table 7 continued

62001 Shrub dominated riparian type

Riparian zones where shrubs comprise more than 25 percent of the vegetative cover and where trees occupy less than 25 percent of the total vegetative cover. Shrubs often include willow species, *Artemisia* species and/or greasewood but other shrubs (e.g. hawthorn, wild plum, birch, alder, tamarisk, shrubby cinquefoil) may be present or dominant. Includes alpine riparian zones dominated by *Salix* species or other shrubs.

62002 Graminoid and forb dominated wetland type

This type includes any non-riverine wetland with vegetation dominated by grasses or forbs. Trees or shrubs cannot occupy more than 25 percent of the total vegetative cover. Includes communities such as wet and moist meadow grasslands, marsh and swamp wetlands, cattail, bullrush and sedge dominated wetlands and inland saltgrass/alkali sacaton dominated wetlands. Includes both low and high salinity wetlands. Low salinity wetlands are characterized by *Typha* spp., *Juncus balticus*, *Carex* spp., and *Spartina pectinatus*. High salinity wetlands are characterized by *Sporabolus airoides*, *Spartina gracilis*, *Distichlis stricta*, *Suaeda depressa*, *Elymus* spp. and *Agropyron* ssp.

62003 Graminoid and forb dominated riparian type

Any riverine wetland with vegetation dominated by graminoids or forbs. Must not have more than 25 percent shrub or tree cover.

71001 Unvegetated playa type

This type includes bare saline playa areas, mud flats, shorelines, sand beaches and gravel bars. Very sparse, salt-tolerant vegetation such as *Salicornia rubra* may be present around margins. Total vegetative cover is less than 10 percent.

73001 Active Sand Dune type

This type includes unvegetated sand dunes where vegetative cover is less than 10 percent. Sand is often actively redistributed by wind.

74001 Basin bare rock and soil type

This type includes naturally occurring areas of bare rock such as cliffs, spires, rock outcrops and talus fields as well as steep scarps of soft rock with total vegetative cover less than 15 percent.

Table 7 continued

74002 Alpine bare rock and soil type

Areas of bare rock or soil including cliffs, spires, and talus fields occurring in the mountain ranges of Wyoming.

75001 Mining operations (and other bare ground disturbance) type

This type includes active and unreclaimed mine sites, strip mines, associated development, drainage ponds, etc., and areas of oil and gas development where the vegetation has been removed or damaged over areas larger than 100 hectares.

82001 Alpine tundra type

This type includes graminoid and forb dominated vegetation that occurs above upper treeline in the alpine zone. Common species include bent grasses, sheep fescue, icegrass, alpine mosses, lichen, silene, avens, sundivort and forget-me-not. Trees or shrubs cannot occupy more than 25 percent of the total vegetative cover.

82002 Subalpine meadow type

Graminoid and forb dominated type occurring within and below upper treeline. Often found in mountain park situations. Trees or shrubs cannot occupy more than 25 percent of the total vegetative cover.

91001 Permanent snow type

Glaciers or snowfields that are present all year or that melt for too short a time to allow vegetation to become established.

Table 8. Geology data for delineated land units of southwest Wyoming. The data were calculated for individual polygons of the Landtype Association coverage, which are identified by the polygon ID number followed by the corresponding land unit code (LUCode). Names associated with the land unit codes are presented in Table 1 of this Appendix, while the geology codes are defined in Table 9 of this Appendix. Geologic units with areas less than 100 ha have been eliminated from the table in most cases. See the methods section for information on how the data were calculated.

Polygon ID (LUCode)	Geology Code	Area [ha]	Area as Percent of Total [%]
11001 (M331X)	Pp	8,629.41	19.93
	PM	6,869.79	15.87
	JTrnd	5,851.29	13.51
	Qg	5,366.49	12.39
	MD	4,512.52	10.42
	Trcd	3,939.74	9.10
	Jsg	1,444.00	3.34
	Qls	1,160.85	2.68
	JTrn	1,041.01	2.40
	OC	1,025.68	2.37
	KJ	863.12	1.99
	Tp	731.00	1.69
	Qa	639.34	1.48
	Wgn	474.98	1.10
	Kmt	230.64	0.53
	Kf	192.07	0.44
	KJg	139.97	0.32
11002 (M331D-11)	Jst	84,047.90	12.95
	Trad	72,357.60	11.15
	Kg	54,779.71	8.44
	Twd	45,966.52	7.08
	Qa	34,652.98	5.34
	JTrn	32,376.67	4.99
	Ka	31,929.62	4.92
	Kbb	28,160.55	4.34
	PPM	28,028.72	4.32
	MD	27,758.03	4.28
	Kbr	22,218.54	3.42
	Kss	20,626.05	3.18
	Qg	19,567.51	3.01
	OC	17,127.11	2.64
	Qt	16,148.56	2.49
	JTrnd	15,485.14	2.39
	Qls	14,438.75	2.22
	Tw	12,728.74	1.96
	PPMa	11,579.86	1.78
	Twlc	10,860.59	1.67
	Th	10,507.53	1.62
	Pp	10,072.64	1.55
	Kf	6,096.30	0.94
	Tte	5,822.45	0.90
	Tp	3,100.61	0.48
	Ksb	2,983.46	0.46
	Kh	2,644.73	0.41
	Tsl	2,128.57	0.33
	Tr	1,463.46	0.23
	TKe	979.45	0.15
	Tcs	823.07	0.13
	Twg	302.19	0.05
	Kha	274.14	0.04
	H20	271.27	0.04
	Kws	265.10	0.04
	Mm	131.86	0.02
11003 (M331D-11)	Qa	246.03	83.81
	H20	47.52	16.19
11004 (M331D-11)	Qa	14.83	80.60
	MD	3.57	19.40
11005 (M331Iu)	Xgy	7,400.16	17.73
	Xsv	6,894.47	16.52
	Xdl	6,652.62	15.94
	WVsv	6,148.61	14.73
	Tm	4,868.78	11.67
	Qg	2,779.53	6.66
	Xm	2,312.24	5.54
	Xqd	1,512.65	3.62
	Qa	1,141.35	2.73
	Xlc	714.16	1.71
	PW	529.96	1.27
	Wgn	488.41	1.17
	Wg	292.88	0.70
11006 (M331Ea)	Qls	17,586.59	45.68
	Qu	6,931.46	18.00
	Qg	3,282.87	8.53
	Tb	2,939.43	7.64
	Tw	2,288.37	5.94
	Qa	2,210.00	5.74
	Tbi	1,751.96	4.55
	Qt	806.29	2.09
	Tgl	269.21	0.70
	H20	226.69	0.59
	QTg	205.38	0.53
11007 (M331J)	Qg	59,754.88	22.68
	Wg	59,168.26	22.45
	WVg	30,115.21	11.43
	Wgn	27,728.05	10.52
	Wgd	23,960.09	9.09
	Ugn	19,385.98	7.36
	WVsv	6,751.10	2.56
	Qa	6,672.39	2.53
	Ugn +	5,979.03	2.27
	OC	2,521.05	0.96
	Trcd	2,312.28	0.88
	MD	2,103.19	0.80
	Jsg	1,995.23	0.76
	Tgc	1,804.70	0.68
	Ws	1,720.84	0.65

112

Table 8 continued

Polygon ID (LUCode)	Geology Code	Area [ha]	Area as Percent of Total [%]
	Kft	1,698.87	0.64
	Pp	1,150.41	0.44
	JTrn	1,120.85	0.43
	KJ	982.74	0.37
	KJg	937.67	0.36
	ICE	928.62	0.35
	PM	911.06	0.35
	Toe	718.66	0.27
	H2O	702.18	0.27
	Kc	618.00	0.23
	Twg	358.34	0.14
	Tep	357.01	0.14
	Twdr	322.45	0.12
	shear	292.07	0.11
	Tw	143.98	0.05
	Ksb	111.63	0.04
	Kmt	110.95	0.04
21001 (342Ga21)	Tm	2,552.18	88.21
	Tbf	209.77	7.25
	Kmv	131.24	4.54
21002 (342Xa21)	Qt	1,391.59	50.14
	PM	387.62	13.97
	Wg	299.82	10.80
	Kc	263.90	9.51
	Pzr	108.13	3.90
	MzPz	105.79	3.81
	Qa	98.85	3.56
21003 (342Gd21)	Tgl	7,897.65	80.21
	Twc	1,770.17	17.98
	Twa	178.71	1.81
21004 (342Xa21)	Qa	830.17	57.07
	Qs	403.93	27.77
	Ws	165.00	11.34
21005 (342Gd21)	Twa	4,974.54	98.55
21006 (342Xa21)	Tbs	2,001.33	49.62
	Qs	510.18	12.65
	Qa	489.98	12.15
	Tfu	392.65	9.74
	Kl	319.59	7.92
	Tcg	200.11	4.96
	Qt	119.52	2.96
21007 (342Ga21)	Twlc	6,580.92	51.81
	OC	1,877.16	14.78
	Qa	1,649.80	12.99
	MD	1,464.81	11.53
	Kav	606.11	4.77
	Twd	284.63	2.24
	Qt	115.16	0.91
	Kh	100.77	0.79
22001 (342Ga22)	Toe	6,571.51	73.72
	Wg	2,342.72	26.28
23001 (342Ge23)	Tp	32,801.32	65.10
	Qa	9,590.90	19.03
	Twlc	4,583.18	9.10
	Th	1,881.12	3.73
	Tw	992.90	1.97
	Qg	219.98	0.44
	Kha	100.33	0.20
23002 (342Ga23)	Twm	18,193.42	28.35
	Tgl	16,414.96	25.58
	Tgt	13,872.47	21.62
	Qs	7,032.03	10.96
	Twc	4,704.44	7.33
	Tb	3,167.60	4.94
	Tgw	549.87	0.86
	Ql	176.54	0.28
23003 (342Xa23)	Twm	4,981.65	25.87
	Tgl	4,495.01	23.35
	Tgt	4,266.71	22.16
	Twc	2,921.90	15.18
	Tb	2,097.95	10.90
	Ql	195.06	1.01
	Qls	134.76	0.70
	Qs	128.72	0.67
24001 (342Ea24)	Tf	18,369.72	18.67
	Tw	18,170.42	18.47
	Tgrw	12,978.72	13.19
	TKe	11,153.73	11.34
	Kss	10,729.20	10.91
	Kg	6,528.72	6.64
	Jst	6,281.07	6.38
	JTrn	3,745.68	3.81
	Trad	3,195.54	3.25
	PPM	1,638.75	1.67
	Qt	1,606.66	1.63
	Qa	1,517.28	1.54
	Qls	1,181.46	1.20
	MD	496.35	0.50
	Sl	401.04	0.41
	Twd	258.04	0.26
24002 (342Ea24)	Tw	4,402.10	58.49
	Tf	2,283.31	30.34
	Qa	736.55	9.79
	H2O	103.78	1.38
25001 (342Ea25)	Tw	77,054.96	43.70
	Tgrw	68,019.44	38.58
	TKe	8,111.59	4.60
	Qls	4,920.59	2.79
	Kf	3,716.56	2.11
	Qa	3,694.83	2.10
	Twd	3,246.18	1.84
	Kh	1,649.75	0.94
	Kav	1,475.18	0.84
	Kss	1,277.41	0.72
	Kg	1,180.94	0.67
	Qt	507.77	0.29
	Ka	367.82	0.21
	Trad	287.82	0.16

Table 8 continued

Polygon ID (LUCode)	Geology Code	Area [ha]	Area as Percent of Total [%]
	H2O	195.34	0.11
	Tgl	186.72	0.11
	Tbi	160.71	0.09
	JTrn	107.81	0.06
25002 (342Ea25)	Tw	25,988.87	88.41
	Qa	2,394.09	8.14
	TKe	459.67	1.56
	Kss	445.19	1.51
	Kg	108.53	0.37
25003 (342Ea25)	Tf	3,010.92	22.22
	Twd	2,826.25	20.86
	TKe	1,783.33	13.16
	Tw	1,515.07	11.18
	Jst	1,386.79	10.23
	Qa	1,141.41	8.42
	Tsl	953.43	7.04
	JTrn	661.35	4.88
	Qt	271.11	2.00
33001 (342Ga33)	Tm	87,271.41	75.50
	Kmv	11,913.74	10.31
	Ks	4,861.96	4.21
	Qa	1,751.76	1.52
	Xgy	1,570.53	1.36
	Kn	1,469.68	1.27
	Qls	1,285.58	1.11
	Xdl	1,270.86	1.10
	Kft	1,176.18	1.02
	KJs	816.65	0.71
	Xsv	689.31	0.60
	Qg	324.38	0.28
	Trc	260.06	0.22
	Xlc	230.18	0.20
	Tbf	136.07	0.12
	Kle	125.90	0.11
	MzPz	125.43	0.11
34001 (342Ga34)	Tgl	88,394.63	53.77
	Tgwt	45,411.00	27.62
	Twm	20,068.41	12.21
	Qa	3,447.13	2.10
	Tbi	2,358.79	1.43
	H2O	2,165.96	1.32
	Tglu	1,327.05	0.81
	Tb	621.22	0.38
	Qls	445.92	0.27
	Twn	111.61	0.07
35001 (342Ga35)	Tgl	19,538.56	48.44
	Twg	13,490.69	33.45
	Twlc	4,048.93	10.04
	Tgw	1,929.74	4.78
	Qa	994.37	2.47
	Qt	176.56	0.44
	H2O	152.59	0.38
35002 (342Ga35)	Twlc	5,969.04	48.88
	Twg	4,422.19	36.21
	Tgrw	1,171.45	9.59
	Qa	648.42	5.31
35003 (342Ga35)	Tgw	1,892.71	53.92
	Twg	982.01	27.97
	Tw	288.56	8.22
	Qa	249.25	7.10
35004 (342Ga35)	Tgw	2,295.47	58.19
	Qa	532.28	13.49
	H2O	485.53	12.31
	Tw	336.20	8.52
	Tgl	159.01	4.03
	Qt	136.61	3.46
36001 (342Ga36)	Tb	4,981.28	97.56
	Tbi	124.82	2.44
36002 (342Ga36)	Tb	11,580.15	62.90
	Tbi	4,757.68	25.84
	Qls	1,953.60	10.61
	Qa	120.10	0.65
36003 (342Ga36)	Tgwt	3,699.35	36.60
	Tbi	2,356.31	23.31
	Twm	1,706.16	16.88
	Qls	1,075.56	10.64
	Twn	534.12	5.28
	Tglu	420.84	4.16
	Tgl	314.26	3.11
36004 (342Ga36)	Twc	2,215.57	65.69
	Tbi	750.42	22.25
	Tgwt	299.18	8.87
36005 (342Gc36)	Tbi	15,938.59	34.90
	Tm	8,352.87	18.29
	Twm	6,164.98	13.50
	Kbl	3,793.52	8.31
	Kba	3,692.77	8.08
	Kr	3,667.16	8.03
	Tfu	2,612.29	5.72
	Ke	1,062.55	2.33
	Kal	269.73	0.59
	Qls	119.92	0.26
36006 (342Ga36)	Twm	1,672.90	92.02
	Tfu	145.11	7.98
36007 (342Ga36)	Tb	845.10	52.99
	Qls	586.12	36.75
	Qa	163.62	10.26
36008 (342Ga36)	Twm	3,957.69	98.50
	Qt	57.24	1.42
36009 (342Ga36)	Qt	9,060.69	66.18
	Twg	4,631.18	33.82
41001 (342Gd41)	Twc	3,029.44	88.04
	Tgl	411.49	11.96
41002 (342Xa41)	Twc	1,361.06	74.08
	Tgl	465.24	25.32

Table 8 continued

Polygon ID (LUCode)	Geology Code	Area [ha]	Area as Percent of Total [%]
41003	Twa	3,742.72	94.73
(342Gd41)	Qs	208.23	5.27
41004	Tgwt	3,189.61	56.36
(342Ga41)	Tgl	1,628.33	28.77
	Twm	810.28	14.32
51001	Tbs	6,512.19	22.88
(342Xa51)	Qa	4,240.89	14.90
	Kl	3,978.51	13.98
	Kmv	3,117.81	10.95
	Tfu	2,733.22	9.60
	Qt	2,535.40	8.91
	Kc	2,336.94	8.21
	Qs	1,077.12	3.78
	Kfl	1,022.16	3.59
	Kle	636.10	2.23
	Kfh	278.07	0.98
51002	Twc	4,914.06	34.70
(342Gd51)	Tm	4,030.17	28.46
	Twm	3,787.23	26.74
	Qa	845.45	5.97
	Tgl	376.61	2.66
	Tgt	208.48	1.47
51003	Kmv	5,987.35	89.41
(342Xa51)	Qa	563.90	8.42
51004	Kle	34,382.78	29.32
(342Ga51)	Kmv	26,968.45	22.99
	Tfu	13,119.54	11.19
	Kl	11,908.59	10.15
	Tm	10,518.44	8.97
	Qs	6,114.40	5.21
	Ks	5,622.46	4.79
	Qa	5,598.71	4.77
	Qls	1,843.70	1.57
	Kn	753.44	0.64
	Twm	304.01	0.26
	Kft	138.37	0.12
51005	Tgl	14,072.26	24.63
(342Gd51)	Twc	8,281.73	14.49
	Tglu	7,510.90	13.14
	Twn	6,561.07	11.48
	Tgwt	5,547.98	9.71
	Twm	5,353.73	9.37
	Tgt	3,715.85	6.50
	Qa	2,654.36	4.64
	Twa	1,842.25	3.22
	Tgw	1,293.86	2.26
	Qls	292.77	0.51
51006	Kf	18,939.03	27.40
(342Ea51)	Ka	9,068.69	13.12
	Tgrw	6,328.90	9.16
	Tw	5,000.69	7.23
	Kg	4,840.85	7.00
	Jst	4,832.09	6.99
	Kbr	3,943.08	5.70
	Twg	3,912.16	5.66
	Twd	3,850.44	5.57
	Kav	2,497.96	3.61
	Kh	1,793.40	2.59
	TKe	1,590.81	2.30
	JTrn	757.19	1.10
	Qa	529.28	0.77
	Qt	430.65	0.62
	Twc	375.39	0.54
	Qls	266.33	0.39
51007	Kav	5,210.37	45.58
(342Ea51)	TKe	1,788.97	15.65
	Kh	1,567.31	13.71
	Tw	1,498.57	13.11
	Tgrw	1,147.75	10.04
	Qa	217.37	1.90
51008	Tfu	14,302.68	19.92
(342Xa51)	Kl	12,527.33	17.45
	Kle	8,749.94	12.19
	Tm	7,419.69	10.33
	Kmv	7,409.12	10.32
	Ksn	5,260.30	7.33
	Kf	3,743.99	5.21
	Qa	3,147.98	4.38
	Kmt	1,791.63	2.50
	PM	1,570.03	2.19
	KJs	1,354.31	1.89
	Cr	1,118.58	1.56
	Mm	1,008.51	1.40
	Kft	844.63	1.18
	Trc	594.35	0.83
	Qt	441.46	0.61
	Kn	281.32	0.39
	Wg	107.65	0.15
51009	Tfu	75,264.39	26.61
(342Gc51)	Kr	55,894.97	19.77
	Kal	40,010.20	14.15
	Ke	30,146.92	10.66
	Kbl	22,710.64	8.03
	Qa	14,016.40	4.96
	Kfl	12,625.89	4.46
	Kl	11,997.43	4.24
	Qs	6,779.24	2.40
	Twm	6,630.66	2.34
	Kle	3,637.62	1.29
	Qi	1,408.14	0.50
	Kba	1,360.05	0.48
	Tbi	314.80	0.11
51010	Kmv	2,649.26	80.80
(342Xa51)	Kc	301.01	9.18
	Qs	251.08	7.66
51011	Twm	3,700.70	58.23
(342Ga51)	Tfu	1,750.15	27.54
	Ke	342.77	5.39
	Kr	223.06	3.51
	Tgwt	186.41	2.93

Table 8 continued

Polygon ID (LUCode)	Geology Code	Area [ha]	Area as Percent of Total [%]
51012	Twm	188.72	80.09
(342Ga51)	H2O	32.33	13.72
	Tgwt	14.59	6.19
52001	Tbs	1,947.85	61.49
(342Xa52)	Tcg	1,092.72	34.49
	Qa	127.40	4.02
52002	Tgl	18,104.33	41.50
(342Gd52)	Twa	12,240.77	28.06
	Tm	10,303.35	23.62
	Twc	1,920.55	4.40
	Qls	575.07	1.32
	Qa	379.31	0.87
52003	Twc	5,118.46	62.17
(342Gd52)	Twm	1,780.94	21.63
	Tgt	1,279.76	15.54
52004	Tgl	7,819.59	69.90
(342Ga52)	Twm	1,547.77	13.84
	Tgwt	1,541.07	13.78
	Qs	278.58	2.49
52005	Twm	4,803.04	49.71
(342Ga52)	Tb	1,664.64	17.23
	Twru	1,002.58	10.38
	Tgl	940.39	9.73
	Toe	441.82	4.57
	Tmu	366.74	3.80
	Tm	225.32	2.33
	Qa	217.24	2.25
52006	Twc	368.05	43.29
(342Xa52)	Tm	342.18	40.25
	Tb	116.32	13.68
61001	Qg	7,356.12	99.96
(342Ge61)			
61002	Qg	2,576.45	59.77
(342Ge61)	Th	1,081.30	25.09
	Qls	378.52	8.78
	Qa	191.68	4.45
61003	Qg	4,169.96	89.58
(342Ga61)	Qls	485.14	10.42
61004	Qg	1,773.83	94.24
(342Ga61)	Tb	99.06	5.26
61005	Qg	21,905.48	86.64
(342Ge61)	H2O	1,113.09	4.40
	Tw	944.65	3.74
	Tgc	300.99	1.19
	Twg	253.90	1.00
	Qa	202.77	0.80
	Wgn	168.22	0.67
	Wg	168.22	0.67
	Qt	159.47	0.63
61006	Qg	8,148.53	92.57
(342Ge61)	Tw	420.66	4.78
61007	Qg	2,917.90	83.15
(342Ge61)	Qa	528.29	15.05
61008	Qg	1,960.92	99.54
(342Ga61)			
61009	Qg	2,257.42	85.55
(342Ge61)	Qa	261.31	9.90
	Wg	119.99	4.55
71001	Twc	57,196.73	66.66
(342Gd71)	Tgt	10,779.59	12.56
	Twm	4,732.95	5.52
	Qs	4,518.98	5.27
	Tglu	3,974.31	4.63
	Tgw	3,367.48	3.92
	Qa	816.65	0.95
	Twn	233.03	0.27
	Tgl	134.01	0.16
71002	Twm	218,563.08	26.07
(342Xa71)	Tbs	201,094.19	23.99
	Qs	123,084.77	14.68
	Ql	76,739.27	9.15
	Qa	61,546.86	7.34
	Twc	42,751.71	5.10
	Tfu	34,682.00	4.14
	Tgt	23,874.20	2.85
	Qt	15,750.01	1.88
	Twn	11,628.84	1.39
	Tglu	9,257.67	1.10
	Tgl	5,014.24	0.60
	Kc	3,473.76	0.41
	Tbw	3,066.59	0.37
	Tm	2,218.86	0.26
	Twr	1,155.17	0.14
	Ken	1,134.56	0.14
	Kn	1,010.96	0.12
	Tb	999.18	0.12
	Ks	557.73	0.07
	Kmv	367.76	0.04
	Tip	180.88	0.02
71003	Twa	118,957.78	55.48
(342Gd71)	Tgl	56,973.46	26.57
	Qs	29,673.40	13.84
	Qa	6,011.95	2.80
	Twc	2,492.76	1.16
	Qt	316.78	0.15
71004	Twm	23,122.13	65.31
(342Ga71)	Qs	6,268.53	17.71
	Qa	4,434.58	12.53
	Tgwt	1,099.62	3.11
	Tgt	153.40	0.43
	Tgl	146.88	0.41
	Tfu	139.58	0.39

Table 8 continued

Polygon ID (LUCode)	Geology Code	Area [ha]	Area as Percent of Total [%]
71005	Qa	2,337.24	82.44
(342Ga71)	Twm	497.80	17.56
71006	Twm	15,148.53	49.00
(342Ga71)	Tfu	8,684.84	28.09
	Qa	7,079.28	22.90
71007	Kba	37,048.07	52.67
(342Gc71)	Kbl	19,635.91	27.92
	Qa	7,485.04	10.64
	Kr	6,127.76	8.71
71008	Twm	67,607.50	43.18
(342Ga71)	Tgw	18,375.55	11.73
	Twc	14,674.52	9.37
	Tglu	12,382.12	7.91
	Twn	11,477.57	7.33
	Tgt	8,648.92	5.52
	Tgwt	7,775.00	4.97
	Qa	6,483.85	4.14
	Qs	5,109.90	3.26
	Tfu	2,459.66	1.57
	Qt	679.33	0.43
	Ke	385.06	0.25
	Tgl	381.59	0.24
72001	Qa	52,528.47	59.98
(342Ga72)	Tb	30,308.44	34.61
	Qt	2,884.86	3.29
	Qls	802.15	0.92
	Qu	625.13	0.71
	Qs	429.59	0.49
72002	Qa	5,751.55	93.45
(342Ga72)	Qu	213.97	3.48
	Qg	109.58	1.78
72003	Qa	121,425.56	36.28
(342Ge72)	Qt	104,207.68	31.13
	Twg	45,551.31	13.61
	Twlc	44,906.82	13.42
	Tp	7,155.63	2.14
	Tw	5,527.65	1.65
	Qg	1,654.25	0.49
	Twd	1,168.84	0.35
	Tgl	1,124.79	0.34
	Wg	509.21	0.15
	Twc	423.40	0.13
	OC	198.30	0.06
	Pp	152.86	0.05
	Kmt	145.01	0.04
	MD	119.30	0.04
73001	Tgl	500,673.17	35.71
(342Ga73)	Tb	456,275.45	32.54
	Twg	104,106.66	7.43
	Qa	84,134.92	6.00
	Tw	51,902.85	3.70
	Qs	45,934.50	3.28
	Tgw	34,159.88	2.44
	Twm	32,056.30	2.29
	Toe	21,667.22	1.55
	QTg	14,374.42	1.03
	Qt	13,133.15	0.94
	Tgrw	11,945.02	0.85
	Twlc	5,105.94	0.36
	Qu	4,941.83	0.35
	Tmu	3,577.07	0.26
	Ql	3,309.04	0.24
	Tm	3,256.51	0.23
	H2O	3,237.34	0.23
	Twc	2,840.09	0.20
	Qls	1,204.09	0.09
	Twd	829.88	0.06
	Wg	782.38	0.06
	Kg	679.06	0.05
	Tgwt	380.94	0.03
	Jst	359.86	0.03
	Tbi	240.43	0.02
	Ws	239.07	0.02
	OC	162.07	0.01
	Kf	129.44	0.01
	JTrn	110.29	0.01
	Kba	107.58	0.01
73002	Toe	3,168.93	93.85
(342Ga73)	Wgn	178.46	5.29
75001	Tgl	19,684.14	73.91
(342Gd75)	Twc	3,635.90	13.65
	Twa	1,759.31	6.61
	Qa	1,554.32	5.84
81001	Qa	20,046.68	50.48
(342Ea81)	QTg	7,379.32	18.58
	Qt	3,921.37	9.87
	Kss	3,178.10	8.00
	Kg	1,588.95	4.00
	Tf	1,560.08	3.93
	Jst	1,118.68	2.82
	PPM	487.49	1.23
	Pp	153.27	0.39
81002	Qa	18,710.65	86.71
(342Ea81)	Tw	783.52	3.63
	Kss	538.14	2.49
	Tf	390.08	1.81
	Kg	321.43	1.49
	Kh	226.02	1.05
	Qls	172.39	0.80
	Kf	161.23	0.75
	TKe	144.53	0.67
	H2O	129.18	0.60
81003	Qa	262.72	53.48
(342Ea81)	Tf	151.60	30.86
	H2O	73.66	14.99
81004	Kh	35,671.27	89.33
(342Ea81)	Kf	2,198.82	5.51
	Qa	930.79	2.33
	Qt	500.41	1.25
	Kav	417.14	1.04
	TKe	111.96	0.28

Table 8 continued

Polygon ID (LUCode)	Geology Code	Area [ha]	Area as Percent of Total [%]
	Qls	100.78	0.25
81005	Qa	30,604.51	84.99
(M331D-81)	Tte	3,807.41	10.57
	Qt	886.39	2.46
	Jst	463.40	1.29
	Tsl	110.48	0.31
81006	Qa	421.85	76.85
(M331D-81)	H2O	100.35	18.28
83001	H2O	734.44	82.20
(342Ga83)	Tgl	141.87	15.88
83002	H2O	499.22	71.95
(342Ge83)	Qg	191.80	27.64
83003	H2O	10,918.00	96.69
(342Ga83)	Tgl	240.46	2.13
	Tgwt	113.46	1.00
83004	H2O	59.70	90.63
(342Ga83)	Qa	5.62	8.53
83005	H2O	3,003.53	95.04
(342Ga83)			
83006	H2O	1,672.50	81.49
(342Ge83)	Qg	217.79	10.61
	Wg	154.85	7.54
83007	Qa	430.19	76.79
(342Ea83)	Twd	90.91	16.23
	Tw	39.08	6.98
83008	H2O	378.74	73.93
(342Ge83)	Qg	125.29	24.46
83009	H2O	150.29	71.81
(M331D-83)	Qa	57.46	27.46
83010	Qa	87.67	61.82
(M331D-83)	H2O	53.51	37.73
83011	H2O	572.37	78.01
(342Ge83)	Qg	159.94	21.80
83012	H2O	516.63	76.95
(342Ea83)	Qa	136.64	20.35

Table 9. Explanation of codes for the geologic units of southwest Wyoming.

Geology Code	Explanation
Cr	CAMBRIAN ROCKS (SOUTH) GALLATIN LIMESTONE, GROS VENTRE FORMATION AND EQUIVALENTS, AND FLATHEAD SANDSTONE (NORTH)
Jsg	SUNDANCE AND GYPSUM SPRING FORMATIONS
Jst	STUMP FORMATION, PREUSS SANDSTONE OR REDBEDS, AND TWIN CREEK LIMESTONE
JTrn	NUGGET SANDSTONE
JTrnd	NUGGET SANDSTONE AND CHUGWATER AND DINWOODY FORMATIONS (NORTH) NUGGET SANDSTONE, ANKAREH FORMATION, THAYNES LIMESTONE, WOODSIDE SHALE, AND DINWOODY FORMATION (THRUST BELT)
Ka	ASPEN SHALE
Kal	ALMOND FORMATION
Kav	ADAVILLE FORMATION
Kba	BAXTER SHALE
Kbb	BLIND BULL FORMATION
Kbl	BLAIR FORMATION
Kbr	BEAR RIVER FORMATION
Kc	CODY SHALE
Kcf	CODY SHALE AND FRONTIER FORMATION
Ke	ERICSON SANDSTONE
Kf	FRONTIER FORMATION
Kfh	FOX HILLS SANDSTONE
Kfl	FOX HILLS SANDSTONE AND LEWIS SHALE
Kft	FRONTIER FORMATION AND MOWRY AND THERMOPOLIS SHALES
Kg	GANNETT GROUP--Includes Smoot Formation, Draney Limestone, Bechler Conglomerate, Peterson Limestone, and Ephraim Conglomerate
Kh	HILLIARD SHALE
Kha	HAREBELL FORMATION
KJ	CLOVERLY AND MORRISON FORMATIONS
KJg	CLOVERLY, MORRISON, SUNDANCE, AND GYPSUM SPRING FORMATIONS
KJs	CLOVERLY, MORRISON, AND SUNDANCE FORMATIONS
Kl	LANCE FORMATION
Kle	LEWIS SHALE
Kmt	MOWRY AND THERMOPOLIS SHALES
Kmv	MESAVERDE FORMATION
Kn	NIOBRARA FORMATION
Kr	ROCK SPRINGS FORMATION
Ks	STEELE SHALE
Ksb	SOHARE FORMATION AND BACON RIDGE SANDSTONE
Ksn	STEELE SHALE AND NIOBRARA FORMATION
Kss	SAGE JUNCTION, QUEALY, COKEVILLE, THOMAS FORK, AND SMITHS FORMATIONS
Kws	WAYAN AND SMITHS FORMATIONS--One outcrop along Idaho border
MD	MADISON LIMESTONE AND DARBY FORMATION (NORTH) MADISON GROUP AND DARBY FORMATION (THRUST BELT)
Mm	MADISON LIMESTONE OR GROUP
MzPz	MESOZOIC AND PALEOZOIC ROCKS--Shown in small areas of complex structure South flank of Ferris Mountains--Nugget Sandstone and Chugwater and Goose Egg Formations (Jurassic? through Permian) West flank of Sierra Madre--Chugwater, Goose Egg, Casper, and Fountain Formations (Upper Triassic through Middle Pennsylvanian)
Ob	BIGHORN DOLOMITE
OC	BIGHORN DOLOMITE, GALLATIN LIMESTONE, AND GROS VENTRE FORMATION (THRUST BELT) BIGHORN DOLOMITE, GALLATIN LIMESTONE, GROS VENTRE FORMATION, AND FLATHEAD SANDSTONE (NORTH)
PM	TENSLEEP SANDSTONE AND AMSDEN FORMATION
Pp	PHOSPHORIA FORMATION (THRUST BELT) PHOSPHORIA FORMATION AND RELATED ROCKS (NORTH)--Intertonguing equivalents of parts of Phosphoria are Park City Formation and Shedhorn Sandstone
PPM	CASPER FORMATION AND MADISON LIMESTONE (SOUTH) WELLS AND AMSDEN FORMATIONS (THRUST BELT)

Table 9 continued

Geology Code	Explanation
PPMa	PHOSPHORIA FORMATION AND RELATED ROCKS, TENSLEEP SANDSTONE, AND AMSDEN FORMATION (NORTH) PHOSPHORIA, WELLS, AND AMSDEN FORMATIONS (THRUST BELT)
PW	MAFIC INTRUSIVE ROCKS
Pzr	MADISON LIMESTONE AND CAMBRIAN ROCKS (SOUTH) MADISON LIMESTONE, DARBY FORMATION, BIGHORN DOLOMITE, GALLATIN LIMESTONE, GROS VENTRE FORMATION, AND FLATHEAD SANDSTONE (NORTH)
Qa	ALLUVIUM AND COLLUVIUM
Qg	GLACIAL DEPOSITS
Qi	ALKALIC EXTRUSIVE AND INTRUSIVE IGNEOUS ROCKS
Ql	PLAYA LAKE AND OTHER LACUSTRINE DEPOSITS
Qls	LANDSLIDE DEPOSITS
Qs	DUNE SAND AND LOESS
Qt	GRAVEL, PEDIMENT, AND FAN DEPOSITS--May include some glacial deposits and Tertiary gravels
QTg	TERRACE GRAVEL (PLEISTOCENE AND/OR PLIOCENE)
Qu	UNDIVIDED SURFICIAL DEPOSITS
Sl	LAKETOWN DOLOMITE--Uinta County
Tb	BRIDGER FORMATION
Tbf	BASALT FLOWS AND INTRUSIVE IGNEOUS ROCKS--West side of Sierra Madre
Tbi	BISHOP CONGLOMERATE
Tbs	BATTLE SPRING FORMATION
Tbw	TRANSITIONAL UNIT BETWEEN BATTLE SPRING AND WASATCH FORMATIONS
Tcd	CAMP DAVIS FORMATION
Tcg	CROOKS GAP CONGLOMERATE
Tcs	CONGLOMERATE OF SUBLETTE RANGE
Tdb	DEVILS BASIN FORMATION
Tep	CONGLOMERATE OF ROARING CREEK (EOCENE OR PALEOCENE)
Tf	FOWKES FORMATION (PLIOCENE? AND EOCENE)
Tfu	FORT UNION FORMATION
Tgc	GRANITIC CONGLOMERATE ABOVE OR IN UPPER PART OF WASATCH FORMATION
Tgl	LANEY MEMBER OF GREEN RIVER FORMATION
Tglu	LUMAN TONGUE OF GREEN RIVER FORMATION
Tgrw	GREEN RIVER AND WASATCH FORMATIONS
Tgt	TIPTON SHALE MEMBER OR TONGUE OF GREEN RIVER FORMATION
Tgw	WILKINS PEAK MEMBER OF GREEN RIVER FORMATION
Tgwt	WILKINS PEAK MEMBER AND TIPTON SHALE MEMBER OR TONGUE OF GREEN RIVER FORMATION
Th	HOBACK FORMATION
Tii	INTRUSIVE AND EXTRUSIVE IGNEOUS ROCKS
Tip	ICE POINT CONGLOMERATE
TKe	EVANSTON FORMATION
TKp	PINYON CONGLOMERATE
Tm	MIOCENE ROCKS
Tmu	UPPER MIOCENE ROCKS
Toe	OLIGOCENE AND (OR) UPPER AND MIDDLE EOCENE ROCKS
Tp	PASS PEAK FORMATION AND EQUIVALENTS
Tr	RED CONGLOMERATE ON TOP OF HOBACK AND WYOMING RANGES (MIOCENE?; MAY BE AS OLD AS EOCENE)
Trad	ANKAREH FORMATION, THAYNES LIMESTONE, WOODSIDE SHALE AND DINWOODY FORMATION
Trc	CHUGWATER FORMATION
Trcd	CHUGWATER AND DINWOODY FORMATIONS
TrPcg	CHUGWATER AND GOOSE EGG FORMATIONS
Tsl	SALT LAKE FORMATION
Tte	TEEWINOT FORMATION
Tw	WASATCH FORMATION
Twa	WASHAKIE FORMATION
Twc	CATHEDRAL BLUFFS TONGUE OF WASATCH FORMATION
Twd	DIAMICTITE AND SANDSTONE OF WASATCH FORMATION
Twdr	WIND RIVER FORMATION
Twg	NEW FORK TONGUE OF WASATCH FORMATION AND FONTENELLE TONGUE OR MEMBER OF GREEN RIVER FORMATION

Table 9 continued

Geology Code	Explanation
Twlc	LA BARGE AND CHAPPO MEMBERS OF WASATCH FORMATION
Twm	MAIN BODY OF WASATCH FORMATION
Twn	NILAND TONGUE OF WASATCH FORMATION
Twr	WHITE RIVER FORMATION
Twru	UPPER CONGLOMERATE MEMBER OF WHITE RIVER FORMATION
Ugn	OLDEST GNEISS COMPLEX--Overprint pattern indicates area of migmatite related to emplacement of 2,600-Ma granite
Wg	GRANITIC ROCKS OF 2,600-Ma AGE GROUP
Wgd	GRANODIORITE OF THE LOUIS LAKE PLUTON
Wgn	GRANITE GNEISS
Ws	METASEDIMENTARY ROCKS
WVg	PLUTONIC ROCKS
WVsv	ETASEDIMENTARY AND METAVOLCANIC ROCKS
Xdl	DEEP LAKE GROUP (METASEDIMENTARY ROCKS)
Xgy	GRANITIC ROCKS OF 1,700-Ma AGE GROUP
Xlc	LIBBY CREEK GROUP (METASEDIMENTARY ROCKS)
Xm	MAFIC INTRUSIVE ROCKS
Xqd	QUARTZ DIORITE
Xsv	METASEDIMENTARY AND METAVOLCANIC ROCKS

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Table 10. A list of the arc attributes for each arc in the Landtype Association coverage.

Arc ID	Type	Source	Length [m]	Note
1001	11	101	12032.024	county boundary from counties coverage
1002	4	224	12218.733	roughly follows wagon creek on south side of pass, raspberry creek on north side
1003	11	101	20855.469	county boundary from counties coverage
1004	11	101	40746.105	county boundary from counties coverage
1005	2	208	6540.981	follows base of slope on west side of green river
1006	2	209	5320.086	cuts across ridges and valleys staying mostly nw of Qg on se side of gros ventre range
1007	11	101	5346.353	county boundary from counties coverage
1008	11	101	10277.506	county boundary from counties coverage
1009	2	219	2210.129	follows base of slope near contact of Qg with units to east on southeast side of gros ventre range
1010	2	206	3881.427	follows western edge of glacial deposits
1011	6	219	12128.300	follows base of slope near south edge of Qg
1012	2	219	3431.813	follows base of southwest slope of gros ventre range near west edge of Qls unit
1013	11	101	61166.941	county boundary from counties coverage
1014	2	219	6337.258	follows jack creek drainage, somewhat south of north edge of Tp unit
1015	12	101	12629.371	state boundary from counties coverage
1016	2	205	4519.008	follows base of slope, connecting to line on west edge of glacial deposits
1017	12	101	2885.655	state boundary from counties coverage
1018	6	205	5868.195	follows base of slope
1019	6	205	91.644	follows base of slope
1020	2	219	7497.132	follows base of northeast slope of pass peak near ne edge of Tp unit
1021	6	107	4017.291	from hydrography coverage. palisades reservoir
1022	6	107	1521.329	from hydrography coverage. palisades reservoir
1023	2	206	21533.049	follows base of slope on east side of green river
1024	6	215	117.478	short arc crossing inlet for greys river. arc not contained in hydrography coverage
1025	6	107	4274.896	from hydrography coverage. palisades reservoir
1026	12	101	2219.655	state boundary from counties coverage
1027	12	101	455.379	state boundary from counties coverage
1028	12	101	992.578	state boundary from counties coverage
1029	6	107	1364.853	from hydrography coverage. palisades reservoir
1030	6	107	4191.856	from hydrography coverage. palisades reservoir
1031	2	208	18840.641	follows base of slope on west side of green river
1032	2	106	11872.207	from geology coverage. green river glacial deposits. contact of Qg with cretaceous units to north
1033	6	106	9859.620	from geology coverage. green river glacial deposits. contact of Qg with Tw or Qa
1034	2	205	14248.204	follows base of east slope
1035	2	206	9489.570	follows west base of slope of saltlick mountain and kendall mountain
1036	6	205	6367.978	follows base of steep slope on west side of star valley
1037	12	101	6394.922	state boundary from counties coverage
1038	2	106	6344.952	from geology coverage. contact of Qg with Qa
1039	2	205	2563.216	includes much of ridge north of new fork lakes
1040	2	107	9916.591	from hydrography coverage. new fork lakes
1041	2	206	10105.873	follows base of slope on west side of hoback river
1042	6	107	4185.310	from hydrography coverage. new fork lakes
1043	2	206	4922.342	drops into hoback canyon, then follows canyon on west side
1044	6	219	30523.420	follows base of minor slopes south of watershed divide between hoback river and green river
1045	6	106	35907.281	from geology coverage. green river glacial deposits. contact of Qg with Tw or Qa
1046	12	101	12406.818	state boundary from counties coverage
1047	11	101	55473.555	county boundary from counties coverage. follows continental divide
1048	6	205	1199.821	follows base of slope on west side of star valley
1049	12	101	823.673	state boundary from counties coverage
1050	12	101	258.182	state boundary from counties coverage
1051	6	106	21101.723	from geology coverage. contact of Qg with Tw, Qa, Qt, or Twg
1052	2	205	14646.032	follows base of slope from new fork lakes to willow lake

Table 10 continued

Arc ID	Type	Source	Length (m)	Note
1053	2	107	9125.683	from hydrography coverage. willow lake
1054	6	107	9370.283	from hydrography coverage. willow lake
1055	2	206	10703.938	follows base of slope on east side of wyoming range
1056	6	205	5909.581	follows base of slope of obvious glacial deposits at west end of willow lake
1057	2	206	6237.728	somewhat arbitrary line passing north of fremont ridge
1058	6	106	95350.375	from geology coverage. green river glacial deposits. contact of Qg with Qa
1059	2	107	20806.973	from hydrography coverage. fremont lake
1060	2	206	3446.385	follows base of slope between fremont lake and half moon lake
1061	6	207	5865.111	follows base of slope of less obvious glacial deposits south of willow lake near west edge of Qg
1062	2	224	1377.655	roughly follows north shore of half moon lake
1063	6	107	17528.539	from hydrography coverage. fremont lake
1064	6	205	51679.414	follows base of slope on east side of star valley
1065	6	106	35338.707	from geology coverage. fremont lake glacial deposits. contact of Qg with Tw, Qa, Qt, or Twg
1066	6	205	6457.457	follows base of slope on east side of star valley
1067	2	207	22116.258	follows base of slope south and west of Wgn from half moon lake to boulder lake
1068	6	207	6709.120	follows base of slope of obvious glacial deposits associated with pole creek
1069	2	107	3287.603	from hydrography coverage. boulder lake
1070	6	107	18264.789	from hydrography coverage. boulder lake
1071	6	207	14712.059	follows base of slope of obvious glacial deposits at west end of boulder lake
1072	2	207	11657.675	follows minor features staying south and west of Wg from boulder lake to scab creek
1073	6	106	14461.904	from geology coverage. contact of Qg with Tw, Qa, Qt, or Twg
1074	2	219	29668.383	follows base of slope east of Twd on east side of wyoming range
1075	6	207	14178.009	follows base of rim formed by resistant layer of Qt. north end of "the mesa"
1076	2	207	5069.090	follows base of slope near west edge of Wg on east side of scab creek valley
1077	11	101	57698.785	county boundary from counties coverage. follows continental divide
1078	2	207	6706.602	follows base of slope near south edge of Wg near silver creek
1079	6	207	9525.776	follows base of slope of obvious glacial deposits associated with silver creek
1080	2	207	4549.687	follows base of slope near west edge of Wg near cottonwood creek
1081	5	205	11430.121	follows base of terrace on south side of east fork river
1082	2	207	11518.862	cuts across features that extend far into plains. roughly follows east edge of Twd
1083	6	207	5968.115	follows base of slope of obvious glacial deposits associated with cottonwood creek
1084	2	207	4498.534	follows base of southwest slope of aspen butte near southwest edge of Wg
1085	11	101	17219.039	county boundary from counties coverage. follows continental divide
1086	6	205	58384.672	follows base of slope on west side of star valley
1087	5	212	14424.815	follows base of slope on west side of east fork river valley
1088	6	205	26060.445	follows base of slope on east side of star valley
1089	2	207	15585.782	follows minor features near contact of Qg with Wg or Wgn where east fork river flows out of mountain
1090	6	207	52240.680	follows base of rim formed by resistant layer of Qt. west and east sides of "the mesa"
1091	6	207	13537.938	follows base of slope of obvious glacial deposits associated with east fork river
1092	2	205	11288.243	cuts across large fan that extends into plains on east side of wyoming range
1093	6	205	16686.225	follows base of slope on south end of star valley (forest dell)
1094	5	205	28963.840	follows base of terrace on south side of new fork river
1095	2	207	4690.522	follows base of slope near south edge of Wg
1096	2	207	719.971	follows big sandy river near south edge of Wg
1097	2	207	16188.925	follows base of slope near west edge of Wg and Wgn from east fork river to big sandy river
1098	2	207	6550.213	follows big sandy river valley near south edge of Wg and Wgn
1099	5	205	146.617	interconnecting line
1100	2	219	3535.393	follows indistinct base of slope near south edge of Wg
1101	6	205	282.536	interconnecting line
1102	5	212	14182.359	follows west side of valley drained by muddy creek and south muddy creek
1103	21	105	19191.701	east side of big sandy unit (14040104) from hydrologic units coverage
1104	2	206	3192.929	transitions from geology criteria (west) to base of steep mountain slope criteria (east)

Table 10 continued

Arc ID	Type	Source	Length [m]	Note
1105	5	205	8220.712	follows base of slope on south side of big sandy river
1106	5	212	5058.414	follows intermittent stream to connect with line on south side of big sandy river
1107	5	205	12045.810	follows base of slope on east side of green river
1108	6	106	5511.887	from geology coverage. big sandy river glacial deposits. contact of Qg with Wg or Toe
1109	2	205	19342.270	follows base of slope in south and middle piney creek drainages
1110	21	105	3619.770	east side of big sandy unit (14040104) from hydrologic units coverage
1111	6	106	9735.626	from geology coverage. big sandy river glacial deposits. contact of Qg with Twg or Toe
1112	6	207	3167.877	follows base of west slope of little prospect mountain. includes granitic rocks (Wg)
1113	6	205	5146.408	ascends from green river valley to rim above breaks
1114	21	105	3309.030	east side of big sandy unit (14040104) from hydrologic units coverage
1115	5	205	5696.719	follows base of slope on large hill north of cretaceous mountain
1116	6	206	13281.734	follows base of northwest slope of little prospect mountain
1117	6	205	5463.120	follows base of southwest slope of prospect mountains. includes fans with boulders
1118	5	205	4425.021	cuts across minor erosional features on east slope of cretaceous mountain
1119	6	205	8519.028	follows watershed divide between green river and alkali creek
1120	21	105	9604.598	east side of big sandy unit (14040104) from hydrologic units coverage
1121	12	101	67544.969	state boundary from counties coverage
1122	6	205	3856.148	follows base of slope of tabernacle butte
1123	5	207	18783.166	follows base of slope on south side of dry basin and south of large Qt units
1124	6	227	10943.403	approximately follows 2200 m contour on southwest side of prospect mtns. includes fans with boulders
1125	6	205	4989.024	follows base of west slope
1126	5	205	19971.021	follows base of slope on east side of green river
1127	5	205	3455.062	crosses green river
1128	6	212	5262.917	follows stream draining southeast end of prospect mountains
1129	2	205	17329.223	follows base of west slope of cretaceous mountain
1130	6	205	11415.970	follows base of northeast slope of elk mountain
1131	6	205	7763.079	follows base of southwest slope of elk mountain
1132	6	205	7017.071	follows base of slope on west side of big mesa
1133	2	205	7704.109	follows base of west slope of hogsback ridge
1134	6	205	27787.387	follows base of slope on east side of big and little mesas
1135	6	207	22438.027	follows base of slope on north side of low, broken cuesta
1136	6	205	8642.987	follows base of slope on south end of big mesa
1137	6	205	19869.645	follows base of slope on south side of low, broken cuesta
1138	6	205	13859.063	follows base of north slope
1139	2	205	5472.798	descends spring branch drainage west of hogsback ridge from pass on north
1140	6	205	14386.242	follows base of south slope
1141	21	105	29407.160	northeast side of big sandy unit (14040104) from hydrologic units coverage
1142	6	205	8260.464	follows base of north slope of pacific butte
1143	6	205	12597.556	goes east of minor erosional features on east side of hogsback ridge
1144	21	105	21116.160	north side of great divide closed basin unit (14040200) from hydrologic units coverage
1145	21	105	3154.585	east side of big sandy unit (14040104) from hydrologic units coverage
1146	6	217	6416.672	roughly follows line of constant elevation (2180 m)
1147	6	205	536.597	follows base of slope
1148	6	205	9898.805	follows base of slope on south side of pacific butte
1149	21	105	8648.255	north side of great divide closed basin unit (14040200) from hydrologic units coverage
1150	6	205	6782.657	follows base of slope
1151	6	205	11874.648	follows base of slope on south end of hogsback ridge
1152	21	105	1123.299	from hydrologic units coverage
1153	12	101	19993.242	state boundary from counties coverage
1154	6	107	30157.729	from hydrography coverage. big sandy reservoir
1155	21	105	13192.820	north side of great divide closed basin unit (14040200) from hydrologic units coverage
1156	21	105	4245.769	east side of big sandy unit (14040104) from hydrologic units coverage

Table 10 continued

Arc ID	Type	Source	Length [m]	Note
1157	6	205	5822.518	follows base of slope of continental peak
1158	6	205	2875.676	follows base of slope on south side of whiskey peak
1159	6	207	6592.877	follows base of slope near contact of Tgl and Twc
1160	2	205	20639.115	follows base of steeper, upper slopes on west side of sublette range
1161	21	105	18068.645	north side of great divide closed basin unit (14040200) from hydrologic units coverage
1162	6	205	13328.279	follows base of slope west of oregon buttes
1163	6	205	13437.454	follows rim of escarpment
1164	21	105	22609.430	north side of great divide closed basin unit (14040200) from hydrologic units coverage
1165	6	218	7883.392	roughly follows 2300 m contour
1166	21	105	66481.180	north side of great divide closed basin unit (14040200) from hydrologic units coverage
1167	6	205	34070.844	follows base of slope. includes holden hill
1168	6	205	31895.084	follows base of slope on east side of green river
1169	6	205	6704.465	follows base of slope on southwest side of stratton rim
1170	6	205	4017.321	follows base of slope on south side of stratton rim
1171	6	226	19068.211	follows base of northwest slope of jack morrow hills defined by slope angle of 3-4 degrees
1172	6	205	20650.416	follows base of slope
1173	2	205	9617.165	follows base of slope on east side of fontenelle creek
1174	6	207	5243.897	follows base of cuesta about 700 m south of contact between Kmv and Kc
1175	2	205	6731.196	follows base of slope on south end of sublette range
1176	2	205	18332.541	follows base of slope on east side of sublette range
1177	6	207	6906.336	follows base of slope near contact of Qa and Kc
1178	21	105	14790.669	north side of great divide closed basin unit (14040200) from hydrologic units coverage
1179	21	105	21551.289	north side of great divide closed basin unit (14040200) from hydrologic units coverage
1180	6	106	2790.785	from geology coverage. contact of Qs with Kc
1181	6	207	28980.693	follows base of slope near contact of Tgl and Twc
1182	21	105	3928.298	from hydrologic units coverage
1183	21	105	4210.973	north side of great divide closed basin unit (14040200) from hydrologic units coverage
1184	6	106	11144.422	from geology coverage. contact of Qs with Qt
1185	6	107	8068.510	from hydrography coverage. fontenelle reservoir
1186	6	207	8862.406	follows base of cuesta near contact of Kmv and Kc
1187	6	205	10163.959	follows base of gentle slope northwest of jack morrow hills
1188	2	205	20153.992	follows base of slope on west side of tunp range
1189	2	205	21973.107	follows minor features near base of gentle mountain slope and near contact of Twd and Twg
1190	2	205	13996.057	follows fontenelle creek
1191	6	107	11485.632	from hydrography coverage. fontenelle reservoir
1192	6	205	52180.664	includes small but obvious gullies at upper reaches of canyons on east side of green river
1193	6	205	3250.173	follows base of west slope of junk hill
1194	6	205	28310.006	follows base of slope. includes holden hill
1195	6	107	721.993	from hydrography coverage. fontenelle reservoir
1196	6	204	270.103	closes fontenelle reservoir polygon where highway crosses fontenelle creek arm
1197	6	107	6362.734	from hydrography coverage. fontenelle reservoir
1198	6	107	1787.474	from hydrography coverage. fontenelle reservoir
1199	6	204	206.502	closes fontenelle reservoir polygon where highway crosses fontenelle creek arm
1200	6	107	6456.411	from hydrography coverage. fontenelle reservoir
1201	2	217	14309.017	approximately follows 2500 m level near base of steeper, upper slopes on south end of tunp range
1202	6	205	3788.031	follows base of west slope of bradley peak
1203	2	205	8635.235	follows sublette canyon low, traverses south across slope up high to gain dempsey ridge
1204	2	217	1162.213	descends from dempsey ridge to about 2500 m level near base of steeper, upper slopes
1205	6	205	15633.669	follows base of slope
1206	21	105	10163.714	east side of great divide closed basin unit (14040200) from hydrologic units coverage
1207	6	205	1055.922	follows base of west slope of bradley peak
1208	6	207	12645.778	follows minor features near eastern edge of Kmv

Table 10 continued

Arc ID	Type	Source	Length [m]	Note
1209	6	107	28350.648	from hydrography coverage. fontenelle reservoir shore
1210	6	207	24695.490	follows base of slope near contact of Tgl and Twc
1211	2	218	28574.809	follows natural path at about 2500 m
1212	21	105	7586.424	east side of great divide closed basin unit (14040200) from hydrologic units coverage
1213	6	207	22114.088	follows base of slope near contact of Qa with Kc or Kmv
1214	6	205	7546.988	follows base of slope on east side of dempsey ridge
1215	6	107	16549.020	from hydrography coverage. naughton reservoir
1216	6	207	7652.253	follows minor features near contact of Qa with Kl
1217	6	205	10948.085	follows base of slope on west side of bull springs rim
1218	6	205	18558.764	follows base of gentle slope northwest of essex mountain
1219	21	105	3546.168	east side of great divide closed basin unit (14040200) from hydrologic units coverage
1220	6	207	27373.127	follows base of slope near contact of Tgt and Twm
1221	6	215	1789.933	separates rolling plains and tablelands (west) from rolling plains (east)
1222	4	207	18515.883	follows base of cuesta about 4 km east of slate creek ridge
1223	6	205	20723.639	follows base of south slope of essex mountain
1224	2	207	8021.610	roughly follows east edge of Twd on west side of commissary ridge
1225	6	207	8214.290	follows base of slope near contact of Kmv with Qa or Qs
1226	6	207	15042.528	follows base of separation rim on east side near contact of Qa or Qs with Kc
1227	2	205	38848.949	follows base of slope on east side of commissary ridge
1228	6	207	4139.487	interconnecting line near contact of Qa with cretaceous units
1229	6	205	8780.190	follows base of slope on west side of bull springs rim
1230	2	205	1615.334	follows base of slope on south end of commissary ridge
1231	6	205	12143.192	follows divide between rock creek and drainages to east
1232	2	207	5551.908	follows base of slope on south end of commissary ridge near west edge of TKe
1233	6	205	42123.551	follows base of slope on west side of bear river valley
1234	12	101	35196.875	state boundary from counties coverage
1235	4	105	43116.848	west side of great divide closed basin unit (14040200) from hydrologic units coverage
1236	6	228	14450.881	follows base of southwest slope of steamboat rim as defined by slope angle of 3-4 degrees
1237	6	228	22840.688	follows base of south slope of steamboat mountain as defined by slope angle of 3-4 degrees
1238	4	105	487.302	west side of great divide closed basin unit (14040200) from hydrologic units coverage
1239	6	207	7596.109	follows base of slope on west side of pomeroy basin near contact of Kh with Kmv
1240	6	207	3726.654	ascends ridge from south to get on divide between rock creek and north fork twin creek
1241	5	207	25225.402	follows imaginary outer boundary of Tfu through Qa. north end of rock springs uplift
1242	4	207	2786.399	follows imaginary outer boundary of Tfu through Qs
1243	6	207	16023.219	follows minor features near contact of Qa with cretaceous units
1244	6	207	7935.505	follows base of slope near mouth of nugget canyon staying mostly east of units in contact with Tw
1245	12	101	10623.803	state boundary from counties coverage
1246	6	205	48132.016	follows base of slope on east side of bear river valley
1247	6	207	6743.369	follows bullpen creek valley staying mostly east of many units in contact with Tw and Tgrw
1248	6	226	23817.273	follows base of west slope of white mountain cuesta defined by slope angle of about 3-4 degrees
1249	21	105	25442.393	east side of great divide closed basin unit (14040200) from hydrologic units coverage
1250	6	207	19786.195	follows base of broken cuesta on west side near contact of Kmv and Ks
1251	4	208	20585.168	closely follows contact of Tfu and Twm
1252	6	207	44271.355	follows base of west slope of oyster ridge near contact of Kh and Kf
1253	4	207	29240.123	follows base of cuesta about 5 km east of oyster ridge mostly within Twg
1254	21	105	2982.008	east side of great divide closed basin unit (14040200) from hydrologic units coverage
1255	6	207	30386.777	follows base of slope near contact of Kmv with Ksn or Kn
1256	6	207	6537.516	follows divide between twin creek and bridger creek near west edge of Tgrw
1257	6	207	18510.350	west side of multiple cuesta and valley unit mostly within Tfu
1258	6	225	7603.938	follows base of west slope of white mountain cuesta defined by slope angle of about 3-4 degrees
1259	6	226	30551.158	follows base of east slope of white mountain cuesta defined by slope angle of about 3-4 degrees
1260	5	208	19487.814	closely follows contact of Tfu and Twm

Table 10 continued

Arc ID	Type	Source	Length (m)	Note
1261	6	205	3313.783	follows base of slope on south end of white mountain cuesta
1262	6	207	26183.764	follows base of slope on west side of major ridge composed of TKe, Tgrw, and Tw
1263	6	215	2254.686	separates rolling plains and tablelands (west) from rolling plains (east)
1264	6	226	13232.141	follows base of slope at north end of baxter basin defined by slope angle of about 4 degrees
1265	6	205	3897.608	follows rim of white mountain escarpment
1266	6	205	5277.275	follows base of slope at north end of white mountain escarpment
1267	6	206	4671.988	transitions from geology criteria (south) to base of slope criteria (north)
1268	6	205	15718.396	includes major gullies on north side of scott canyon
1269	6	205	6865.973	follows base of slope on east side of north baxter basin
1270	6	207	28635.789	follows base of slope on west side of cumberland flats near contact of Kh with Kav
1271	6	207	9306.517	follows base of slope on west side of major ridge within Kav
1272	4	105	25338.836	deviates from contact of Tfu and Twm to include gullied terrain, s side of hydrologic unit 14040200
1273	6	205	7824.943	follows north rim of scott canyon
1274	4	208	3493.353	closely follows contact of Tfu and Twm
1275	6	207	8935.912	follows base of escarpment south of crockers point near contact of Kh with Kav
1276	5	202	13194.338	contact of Tfu and Twm from geology coverage. west side of rock springs uplift
1277	6	205	10702.226	follows canyon rim on west side of alkali creek
1278	6	219	9594.653	closely follows contact between Kba and Kbl. west side of north baxter basin
1279	12	101	26154.123	state boundary from counties coverage
1280	6	207	22675.604	follows base of slope on east side of separation creek valley near contact of Qa and Tfu
1281	5	208	5515.074	closely follows contact of Tfu and Twm
1282	12	101	1937.226	state boundary from counties coverage
1283	6	205	4086.816	follows base of slope on east side of bear river valley
1284	6	207	3809.416	follows minor valley within Tfu
1285	4	207	21375.986	follows base of cuestas near north edge of Tglu unit
1286	4	105	24930.107	south side of great divide closed basin unit (14040200) from hydrologic units coverage
1287	6	207	33062.809	follows bear river divide near west edge of Tgrw
1288	6	107	4278.513	from hydrography coverage. west shore of woodruff narrows reservoir
1289	6	205	6745.094	follows base of slope on west side of bear river valley
1290	4	207	16489.725	follows base of cuesta near the west and south edges of Tglu unit
1291	6	215	4577.461	interconnecting line, missing 30 m dem data
1292	6	107	5441.125	from hydrography coverage. east shore of woodruff narrows reservoir
1293	6	205	11844.829	captures gullied slopes on west side of green river
1294	6	207	30180.027	follows base of slope near contact of Kba and Kbl. east side of north baxter basin
1295	6	205	33546.961	follows rim of white mountain escarpment
1296	6	107	2246.113	from hydrography coverage. west shore of woodruff narrows reservoir
1297	6	107	2195.083	from hydrography coverage. south shore of woodruff narrows reservoir
1298	6	205	1779.709	follows base of slope on east side of green river
1299	6	205	34105.430	follows base of slope on south and east sides of white mountain escarpment
1300	6	205	17204.061	follows west side of section containing small, parallel ridges and valleys
1301	4	207	4495.673	follows base of cuesta near the west edge of Tglu unit
1302	6	207	17962.379	follows base of slope on west side of cumberland flats near contact of Kh with Kf
1303	21	105	80322.586	east side of great divide closed basin unit (14040200) from hydrologic units coverage
1304	21	105	3439.843	east side of muddy unit (14050004) from hydrologic units coverage
1305	6	205	22146.027	follows base of delaney rim
1306	6	205	2255.300	interconnecting line
1307	6	205	47638.801	follows line about 600 m away from ridge
1308	6	205	6117.634	goes around southern end of minor ridges
1309	6	205	21738.625	follows edge of delaney rim
1310	6	205	860.574	interconnecting line
1311	6	205	5527.034	follows base of slope on west side of cumberland flats
1312	6	207	6953.682	follows minor features within Tfu

Table 10 continued

Arc ID	Type	Source	Length [m]	Note
1313	4	105	21189.588	south side of great divide closed basin unit (14040200) from hydrologic units coverage
1314	4	105	23060.031	south side of great divide closed basin unit (14040200) from hydrologic units coverage
1315	4	207	9093.243	follows subtle features near east edge of Tglu unit
1316	6	207	20600.408	follows base of slope near contact of Kba and Kbl. west side of n. and s.baxter basins
1317	6	212	924.125	closes reservoir polygon just below davis bottom
1318	6	205	8630.810	follows base of slope on west side of miller hill
1319	6	205	15704.987	follows edge of delaney rim
1320	6	205	15953.644	follows base of delaney rim
1321	5	207	6116.322	follows subtle features near east edge of Tglu unit
1322	6	205	21101.645	follows canyon rim on west side of green river
1323	6	207	8177.576	follows chicken springs wash within Tfu
1324	6	205	17088.391	follows bear river divide
1325	5	207	27124.590	follows base of slope near contact of Tfu and Twm on west side of rock springs uplift
1326	6	205	24253.158	follows base of slope on east and north sides of canyonlands unit. includes wilkins peak
1327	6	205	16331.840	captures some canyonlands terrain on east side of blacks fork
1328	6	205	9641.347	follows rim on west side of blacks fork
1329	6	205	5820.443	descends valley from bear river divide
1330	5	207	5917.161	follows base of slope on west side of narrow ridge near contact of Tfu and Twm
1331	6	207	11720.223	follows base of minor rim. captures Qa units to south
1332	6	207	2205.558	descends pleasant valley creek near east edge of Tke
1333	6	207	14519.602	follows north bank of blacks fork near contact of Qa and Tb
1334	6	107	32556.711	from hydrography coverage. flaming gorge reservoir
1335	4	205	55486.371	follows base of cuesta about 5 km east of the hogsback mostly within Tgrw
1336	6	207	19367.689	follows west side of segmented cuesta near contact between Kav and Tke
1337	6	207	54469.883	follows base of west slope of the hogsback near contact of Kh and Kf
1338	6	207	18285.303	follows base of cuesta on west side of cumberland flats about 700 m ese of contact between Kh and Ka
1339	6	207	19720.387	follows base of rim formed by Tm
1340	6	205	23475.244	follows rim on west side of blacks fork arm of flaming gorge reservoir
1341	6	207	55595.176	follows base of rim formed by Tm. includes quaking aspen mountain at north end
1342	21	105	27224.314	east side of muddy unit (14050004) from hydrologic units coverage
1343	6	205	21486.467	follows base of slope on west side of bear river valley
1344	6	207	5206.722	captures Qa units to south
1345	6	207	11447.486	follows base of slope of small hills south of cumberland flats and south of large cretaceous units
1346	6	207	4167.028	approximately follows east edge of Tke
1347	6	205	24880.369	follows base of slope on east side of bear river valley
1348	6	107	25789.879	from hydrography coverage. flaming gorge reservoir
1349	5	207	8200.267	follows base of slope west of rim formed by Tbi
1350	6	206	20473.762	follows base of steeper upper slopes on east side of muddy creek drainage
1351	6	107	28921.855	from hydrography coverage. flaming gorge reservoir
1352	6	207	19983.080	follows base of rim formed by Tbi
1353	6	205	40173.383	follows base of slope of the haystacks
1354	6	205	9235.859	base of slope, excludes rough but low terrain just south of line
1355	6	107	8613.682	from hydrography coverage. flaming gorge reservoir
1356	6	107	18477.762	from hydrography coverage. flaming gorge reservoir
1357	6	205	4722.562	follows pine creek (mostly). goes thru pass south of sand butte
1358	6	107	24763.742	from hydrography coverage. flaming gorge reservoir
1359	5	207	55032.078	follows base of cuestas near north and west edges of Tglu unit
1360	21	105	20377.707	east side of little snake unit (14050003) from hydrologic units coverage
1361	6	205	4013.071	follows rendle lake draw drainage
1362	6	205	15918.857	follows rim on west side of blacks fork arm of flaming gorge reservoir
1363	6	205	40798.242	follows line about 600 m away from ridge
1364	6	217	3602.623	cuts across slope at about constant elevation

Table 10 continued

Arc ID	Type	Source	Length [m]	Note
1365	5	205	7113.344	follows natural lines up and over ridge formed by an arm of Tbi extending west
1366	6	107	10707.474	from hydrography coverage. flaming gorge reservoir
1367	6	217	7750.786	goes around pine butte on west side at about constant elevation
1368	5	205	5982.885	follows gully to the base of kinney rim near pine butte
1369	6	207	14871.898	approximately follows contact between Qa and Tb
1370	6	205	12463.540	follows base of slope on west side of yellow creek
1371	12	101	37878.742	state boundary from counties coverage
1372	5	207	21741.592	follows base of weak rim near east edge of Tglu unit
1373	6	107	24255.866	from hydrography coverage. flaming gorge reservoir
1374	6	205	26270.805	follows base of minor rim
1375	6	207	19151.303	follows base of slope on east side of bigelow bench and west of large Qa unit
1376	6	205	30201.682	follows edge of minor rim
1377	6	205	13433.399	follows base of slope on east side of yellow creek
1378	12	101	1781.409	state boundary from counties coverage
1379	4	205	16791.280	follows base of minor cuesta within or near Tgrw unit
1380	6	106	2345.342	from geology coverage. blacks fork glacial deposit. contact between Qg and Tb
1381	6	107	23586.730	from hydrography coverage. flaming gorge reservoir
1382	6	205	3701.403	follows base of gentle slope. separates inner plains from outer plains
1383	6	217	9411.855	follows watershed divide between muddy creek and savery creek near contact of Tm and Kmv
1384	5	207	8740.669	follows base of slope in sage creek drainage. west of rim formed by Tbi
1385	5	207	8073.407	follows base of kinney rim near contact of Tgl with Twc
1386	5	207	6796.750	follows base of broken cuesta with rim near contact of Tgt and Twm
1387	6	205	7243.706	follows base of gentle slope on west side of cuesta
1388	6	207	31099.143	follows west edge of multiple cuesta and valley complex near contact of Tfu and Twm
1389	6	207	31490.090	follows base of rim formed by Tbi
1390	6	205	53124.512	follows base of slope
1391	6	205	22034.592	follows base of slope on east side of bear river valley
1392	6	107	14081.339	from hydrography coverage. flaming gorge reservoir
1393	4	205	9794.835	somewhat arbitrary line connecting east side of hilliard flat with line from north
1394	6	209	1982.907	approximately follows contact of Tfu with Twm
1395	6	106	7651.865	from geology coverage. blacks fork glacial deposit. contact between Qg and Qls
1396	6	106	1261.093	from geology coverage. contact of Tfu with Twm
1397	6	205	9462.776	captures rougher, upper slopes on north side of flat top mountain
1398	6	209	585.860	follows imaginary line of contact between Tfu and Twm across Qa
1399	6	107	20380.967	from hydrography coverage. flaming gorge reservoir
1400	6	107	24572.350	from hydrography coverage. flaming gorge reservoir
1401	6	207	9718.882	follows base of southeast slope of miller mountain. rim formed by Tbi
1402	6	205	5267.563	follows minor drainage
1403	6	207	15520.525	follows base of steeper, upper slopes of sage creek mountain, which is capped with Tbi
1404	2	207	25754.131	generally follows natural features at or near contact of Wg, Wgn, Xdl, Xav, Xgy, Xm, ... with Tm.
1405	5	207	10524.772	follows base of southwest slope of miller mountain. rim formed by Tbi
1406	5	207	4008.763	follows base of southeast slope of miller mountain. rim formed by Tbi
1407	6	207	17622.363	stays northwest of sage creek mountain and hickey mountain at edge of associated rough terrain
1408	6	107	16523.479	from hydrography coverage. flaming gorge reservoir
1409	2	207	855.636	follows base of northwest slope of hickey mountain near contact of Qls and Tb
1410	2	207	2906.803	follows base of northwest slope of hickey mountain near north edge of Qls
1411	6	106	20538.604	from geology coverage. blacks fork glacial deposit. contact between Qg and Qa
1412	6	205	34918.977	follows base of steeper, upper slopes of black mountain and twin buttes
1413	6	106	566.378	from geology coverage. blacks fork deposit. contact between Qls and Qa
1414	2	205	3730.622	climbs out of blacks fork valley
1415	5	207	95572.383	follows natural lines on south side of rock springs uplift near contact of Tfu and Twm
1416	6	107	16334.311	from hydrography coverage. flaming gorge reservoir

Table 10 continued

Arc ID	Type	Source	Length [m]	Note
1417	6	205	5586.804	follows ridge line, capturing sage creek drainage in canyonlands unit
1418	2	207	10966.318	follows base of slope of cottonwood mountain near north edge of Qls
1419	2	205	3696.719	follows base of small hills in east fork of smiths fork drainage
1420	6	106	12050.079	from geology coverage. contact between Qg and QTg
1421	6	106	3328.619	from geology coverage. blacks fork glacial deposit. contact between Qg and Qa
1422	6	207	67339.066	follows base of steeper, upper slopes of cedar mountain, which is capped by Tbi
1423	2	207	11272.626	follows base of slope of thunderbolt mountain near north edge of Qls
1424	2	205	5358.781	follows base of north slope
1425	6	107	23892.742	from hydrography coverage. flaming gorge reservoir
1426	6	106	379.163	from geology coverage. blacks fork glacial deposit. contact between Qg and Qls
1427	2	205	3727.929	captures part of ridge before dropping into blacks fork valley
1428	2	205	6819.867	follows base of slope on east side of blacks fork valley
1429	6	205	22313.896	follows rim of escarpment
1430	6	205	24406.643	base of slope
1431	6	205	21373.961	follows base of slope of flat top mountain
1432	6	205	20383.734	follows base of steeper upper slopes on southwest side of flat top mountain
1433	6	107	20502.242	from hydrography coverage. flaming gorge reservoir
1434	6	106	10740.709	from geology coverage. contact of Tfu with Twm
1435	6	206	21205.336	captures several dry washes
1436	2	205	3076.878	turns north to capture part of ridge on west side of blacks fork valley
1437	2	207	27480.006	follows base of steeper, upper mountain slopes. roughly follows north edge of Qu
1438	4	205	17245.145	follows base of slope on east edge of hilliard flat
1439	6	224	15034.562	follows base of gentle slope, somtimes along streams, on west side of the bluffs
1440	6	207	20367.082	follows west rim of plateau near contact of Tm with Kmv or Qls
1441	5	219	19201.449	follows base of broken cuesta with rim near contact of Tgt and Twm
1442	6	207	8134.307	follows base of slope on sides of henrys fork valley near contact of Qa with Tb or Qu
1443	6	106	11760.637	from geology coverage. henrys fork alluvium. contact between Qa and Tb
1444	6	207	40035.758	follows base of steeper, upper slopes of little mountain, which is capped by Tbi
1445	6	205	40620.941	follows base of slope on west side of bear river valley
1446	12	101	32386.824	state boundary from counties coverage
1447	6	207	10379.656	follows base of steeper, upper slopes of little mountain, which is capped by Tbi
1448	2	205	1522.363	follows base of slope on east side of bear river valley
1449	12	101	2848.590	state boundary from counties coverage
1450	6	106	1343.487	from geology coverage. henrys fork glacial deposit. contact between Qg and Tb
1451	2	219	19837.344	follows base of slope of hickey mountain near contact of Qls and Tb
1452	5	228	19110.102	follows base of west slope of kinney rim defined by slope angle of 3-4 degrees
1453	6	107	19608.160	from hydrography coverage. flaming gorge reservoir
1454	6	205	3645.348	follows ridge near contact of Qls
1455	6	205	28406.818	follows base of gentle slope on east side of kinney rim
1456	6	107	18456.391	from hydrography coverage. flaming gorge reservoir
1457	2	207	4831.822	follows base of southwest slope of table mountain near contact of Qls with Tb
1458	12	101	46615.746	state boundary from counties coverage
1459	6	106	22682.441	from geology coverage. henrys fork glacial deposit. contact between Qg and Qa
1460	12	101	2822.900	state boundary from counties coverage
1461	6	207	6368.152	follows base of slope on east side of muddy creek near contact of Tfu and Qa
1462	6	205	4707.399	follows ridge connecting little mountain to richards mountains
1463	6	216	5968.871	follows east edge of lush vegetation indicated by red in henrys fork valley
1464	12	101	8463.173	state boundary from counties coverage
1465	6	107	12839.279	from hydrography coverage. flaming gorge reservoir
1466	6	205	2085.605	follows base of north slope of richards mountains
1467	6	205	18946.627	follows base of slope
1468	6	205	8282.799	captures gullies on southwest side of sand creek

130

Table 10 continued

Arc ID	Type	Source	Length [m]	Note
1469	6	205	27771.164	follows base of gentle slope on north side of powder rim
1470	6	205	12821.336	follows minor features between kinney rim and powder rim
1471	6	205	19550.186	northern boundary of multiple cuesta and valley complex. cuestas are obscured in places
1472	6	212	7177.476	follows strecktus draw at base of gentle slope
1473	6	205	5941.339	captures gullies feeding into sand creek
1474	6	107	5747.827	from hydrography coverage. flaming gorge reservoir
1475	6	205	3401.316	captures cuestas that are a continuation of cuestas on east side of reservoir
1476	6	107	3606.633	from hydrography coverage. flaming gorge reservoir
1477	6	216	505.406	follows south shore of henrys fork arm of flaming gorge reservoir
1478	12	101	42102.043	state boundary from counties coverage
1479	6	107	411.992	from hydrography coverage. flaming gorge reservoir
1480	6	216	423.515	follows north shore of henrys fork arm of flaming gorge reservoir
1481	12	101	1355.220	state boundary from counties coverage
1482	6	216	167.117	follows west shore of flaming gorge reservoir
1483	12	101	2997.687	state boundary from counties coverage
1484	6	107	15090.187	from hydrography coverage. flaming gorge reservoir
1485	6	216	524.263	follows east shore of flaming gorge reservoir
1486	12	101	5083.129	state boundary from counties coverage
1487	6	205	11132.070	follows base of slope of richards mountains
1488	6	205	9062.875	follows base of slope of richards mountains
1489	6	205	4400.201	follows base of slope. separates plains from single cuesta
1490	5	207	12860.272	follows base of cuesta with rim near contact of Tgt and Twm
1491	6	205	2107.138	separates multiple cuesta and valley from single cuesta
1492	6	205	7076.330	follows east rim of cottonwood creek
1493	6	217	1014.324	follows ridge
1494	12	101	21138.613	state boundary from counties coverage
1495	6	205	24360.328	follows base of slope
1496	12	101	11799.237	state boundary from counties coverage
1497	6	205	22846.361	follows base of steeper, upper slopes of pine mountain
1498	6	205	20023.482	follows base of steeper, upper slopes of tepee mountains. cuts across many gullies
1499	12	101	9199.213	state boundary from counties coverage
1500	6	207	8468.585	follows base of slope within Tfu
1501	6	205	2654.642	cuts across little snake river to willow creek drainage
1502	12	101	44106.922	state boundary from counties coverage
1503	5	207	15478.049	follows base of cuesta near contact of Tgl with Twc
1504	12	101	9756.666	state boundary from counties coverage
1505	6	207	14429.662	follows base of gentle slope near contact of Tgl and Twc
1506	12	101	22691.412	state boundary from counties coverage
1507	12	101	17107.262	state boundary from counties coverage
1508	5	207	17682.916	follows base of slope near contact of Qa and Twm and south of Tm units
1509	12	101	14656.079	state boundary from counties coverage
1510	5	207	6343.575	follows base of slope near contact of Qa and Twm and east of Tm unit
1511	12	101	2803.698	state boundary from counties coverage
1512	6	207	16219.321	approximately follows contact between Tm and Kmv
1513	6	207	3682.567	follows northeast side of willow creek drainage near contact of Tfu and Qa
1514	12	101	17000.238	state boundary from counties coverage
1515	6	207	1700.553	follows base of slope of battle mountain, which is capped by Tbf
1516	12	101	19186.566	state boundary from counties coverage
1517	6	207	17301.668	follows base of slope of battle mountain, which is capped by Tbf
1518	12	101	2948.847	state boundary from counties coverage
1519	2	227	33205.340	follows features on 30 m shaded relief near base of steep slopes most clearly seen on 60 m image
1520	12	101	18413.811	state boundary from counties coverage
1521	21	105	66202.281	east side of little snake unit (14050003) from hydrologic units coverage
1522	12	101	14868.933	state boundary from counties coverage

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04-22-99